FOR CONTRACT NO.: 05-0T0004
ID NO. 0500000471

INFORMATION HANDOUT

MATERIALS INFORMATION

ABSORB 350
INSTALLATION AND MAINTENANCE MANUAL

ADIEM 350
INSTALLATION AND MAINTENANCE

ADIEM 30'
ERECTION DETAILS

QUADGUARD CZ SYSTEM
OVERVIEW, FEATURES AND BENEFITS

QUADGUARD CZ SYSTEM ON A PLATE
DRAWINGS

ROUTE: 05-SB-154-R7.8/R8.3

ABSORB 350®

Non-Redirective, Gating Crash Cushion

INSTALLATION AND MAINTENANCE MANUAL

For Permanent, Portable, and Moveable Concrete Barrier

9 Element ABSORB 350 attached to Moveable Concrete Barrier

9 Element ABSORB 350 attached to Portable Concrete Barrier

3 Element ABSORB 350 attached to Portable Concrete Barrier

"Advancing Safety Through Innovation"

BARRIER SYSTEMS

A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

010912 v8

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www.BarrierSystemsinc.com

ABSORB 350® Crash Cushion INSTALLATION

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PREFACE

The Barrier Systems, Inc. (BSI), ABSORB 350® crash cushion system incorporates the newest roadside safety materials and engineering processes.

As with any roadside safety device, the ABSORB 350 system must be installed properly to ensure proper performance. Thoroughly review and fully understand the installation instructions and product limitations before starting the installation. An instructional video is available from BSI to help explain the general installation requirements. Watch and fully understand the ABSORB 350 *Installation and Assembly Video* before attempting to install this crash cushion. Do not start the installation without the proper plans and tools required for installation.

If you need additional information, or have questions about the ABSORB 350 Crash Cushion, please call the BSI Customer Service Department at (888) 800-3691 (U.S. toll free) or (707) 374-6800.

INTRODUCTION

The ABSORB 350 system has been tested to meet the rigorous requirements of NCHRP Report 350, Test Levels 2 and 3. The system attaches to portable, permanent, and moveable concrete barrier.

The ABSORB 350 system is a non-redirective, gating crash cushion that has superior overall performance to sand barrels for narrow hazard protection, with similar performance characteristics to other non-redirective, gating crash cushion systems. ABSORB 350 is easy to install and requires no foundation or anchoring. It is easy to maintain, and it restores in minutes after impact.

The ABSORB 350 system has been fully tested in conformance with NCHRP Report 350 and approved by the U. S. DOT Federal Highway Administration as well as several countries outside of the U.S. Non-redirective, gating, crash cushions are frequently used at locations where it is desirable for the vehicle post impact trajectories to be behind the system. If it is desirable to have the majority of post impact vehicle trajectories on the impact side of the system, a redirective, non-gating crash cushion should be considered.

ABSORB 350® Crash Cushion INSTALLATION

SYSTEM OVERVIEW

The ABSORB 350 system is designed and constructed to provide acceptable structural adequacy, minimal occupant risk and safe vehicle trajectory as set forth in NCHRP 350 for a Non-Redirective, Gating, Crash Cushion. Individual sections of the system are linked and pinned together to form a continuous freestanding installation (the system is not anchored to the foundation surface). The effective length of each element is 1m and the effective overall height is 800 mm. The effective width of the upright portion of each section is 61 cm. Each section is fabricated out of a roto-molded shell that is filled with water and fitted with steel hardware to allow the sections to be connected. The mass of each section is approximately 50 kg (110 lbs.) empty and 315 kg (695 lbs.) filled.

REQUIRED TOOLS

½" (12 mm) drive deep sockets:
19 mm, 24 mm

Open / box end wrench:
19mm, 24mm

½" (12 mm) drive ratchet with extensions

Rotohammer for drilling holes in concrete:
1/2" (12 mm) X 10" (250 mm) bit

Measuring tape

Safety equipment: glasses, gloves

½" Air impact wrench (Optional)

3" Hole saw (for drilling second hole in some elements)

Round tapered aligning bar

Note: The tools list is a general recommendation. Depending on the specific characteristics of the job site, additional tools may be necessary.

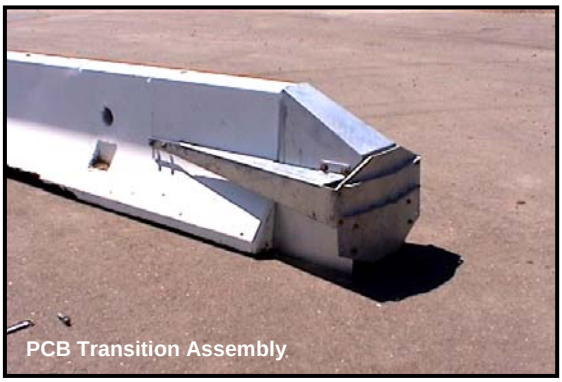
BEFORE ABSORB 350 INSTALLATION

Placement and use of the ABSORB 350 system should be accomplished in accordance with the guidelines and recommendations set forth in the "AASHTO Roadside Design Guide," FHWA memoranda and other state and local standards.

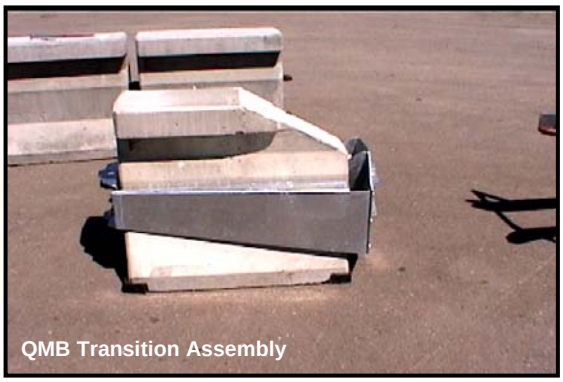
Depending on the application and circumstances at the job site, installation and assembly should take a two-person crew less than 1 hour.

The ABSORB 350 is a highly engineered safety device made up of a relatively small number of parts. Before starting the assembly, become familiar with the basic elements that make up the ABSORB 350 system.

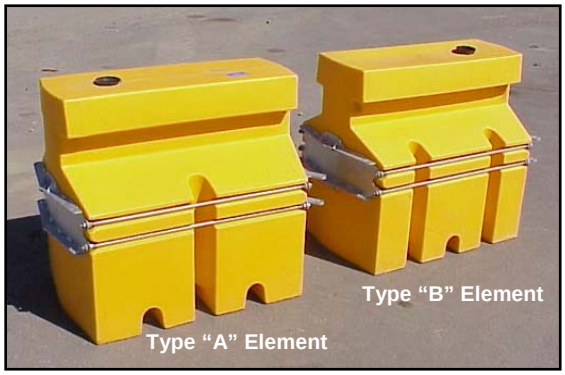
Installing the ABSORB 350 is as easy as A - B - C



OR



A – Install either the PCB or QMB Transition Assembly - Page 5



B – Assemble the ABSORB 350 elements (PCB OR QMB style) – Page 12

OR

C – Install either the PCB or QMB Nose Piece - Page 14

ABSORB 350® Crash Cushion INSTALLATION

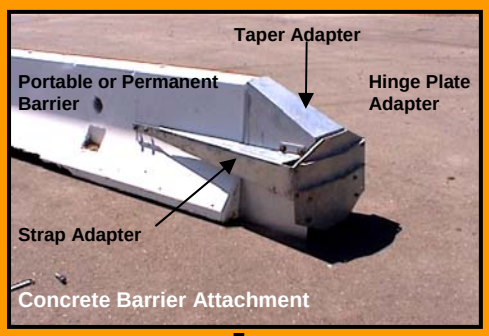
The transition installation portion of this manual is split into two columns.

CHOOSE THE TYPE OF TRANSITION

PCB or **QMB**

Follow the instructions for the transition you are installing

PCB TRANSITION



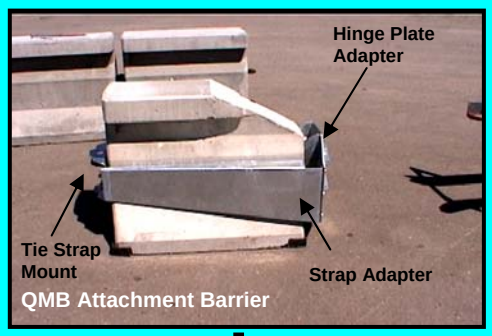
INSTALLATION TO PCB

One or two people can easily accomplish the initial installation. **The installation should be completed prior to filling the energy absorbing elements with water.** Start installing the transition assembly first at the concrete barrier wall end and assemble towards the nosepiece. ***Before starting the installation, open and inspect all of the hardware kits. Lay out all nuts, bolts and washers as needed for the installation.***

STEP 1
Attach the PCB transition to the concrete barrier using the pin and loop system.

NOTE: For installation to a Permanent Concrete Barrier skip to step 1.8.

QMB TRANSITION



INSTALLATION TO QMB

One or two people can easily accomplish the initial installation. **The installation should be completed prior to filling the energy absorbing elements with water.** Start installing the transition assembly first at the QMB wall end and assemble towards the nosepiece.

STEP 1
Install the transition hardware on the QMB Attachment Barrier. **Do not attach the transition hardware to a Standard QMB Barrier. The system will not function as designed without this special sloped barrier. Severe injury may occur.** Use the following steps to install the transition hardware.

PCB TRANSITION

1.1 Insert the Anchor Bolts through the holes in the adapter. There are two sets of holes in the adapter; use the holes on the top of each set.

1.2 Install the nuts with washers on the end of the anchor bolts that are now on the inside of the transition.

1.3 Remove the pin from the end of the PCB.

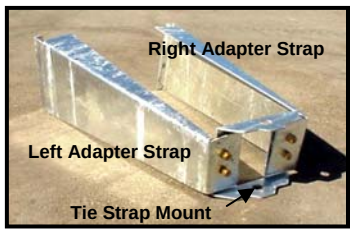
1.4 Align the Anchor bolt loops with the PCB loops so the pin can pass through all four of the loops. If there is interference due to the height of the Anchor Bolt loops, adjust the height of

QMB TRANSITION

1.1 Remove the pin from the sloped end of the QMB Attachment Barrier

1.2 Fit the adapter plate over the hinge on the sloped end of the QMB Attachment Barrier.

1.3 Secure the Hinge Plate Adapter to the Attachment Barrier by installing a QMB Hinge Pin.



1.4 Assemble and install the Strap Adapters around the Attachment QMB.

PCB TRANSITION

the Anchor Bolts by repeating step 1.1.

1.5 Install the pin down through the four loops.

1.6 Tighten the nuts on the Anchor Bolts so that the adapter is tight against the PCB.

1.7 Tighten the four nuts on the Anchor Bolts to 15 ft-lbs (20 Nm). Then install a jam nut against the first nut with a torque of 40 ft-lbs. (55 Nm).

1.8 **OPTION:** In the event that the Taper Adapter is installed on a permanent concrete wall, mounting bolts must be installed. Place the Taper Adapter against the wall in its proper position. A punch can be used to mark the

QMB TRANSITION

1.5 Attach the Adapter Straps to the Tie Strap Mount with the (4) 5/8" x 1 1/4" NC GRJ CADIIPLTD bolts, and (4) Nylock Nuts. **The (4) washers are spacers and must be installed between the strap and the Tie Strap Mount as shown.**

1.6 Attach the Nylock nuts on the ends of the bolts. Make sure to install the nuts on the outside of the strap as shown and hand tighten.

1.7 Repeat steps 1.5 and 1.6 on the other strap.

View of the pin end of the strap assembly after bolting up

PCB TRANSITION

concrete in the four spots that the anchor bolts would be located.

1.9 Drill four holes and install the ½" wedge anchor bolts. Torque the ½" nuts on the wedge anchor bolts to 40 ft-lbs (55 N-m).

1.10 Once the Taper Adapter has been securely attached (using either method mentioned above), install the Side Straps to both sides of the Taper Adapter. ATTACH LOOSELY, DO NOT TIGHTEN AT THIS TIME.

1.11 Attach the Hinge Plate Adapter to the Side Straps and Taper Adapter with eight (8) ½" x 1¼" (12 mm x 32 mm) NC GR 5 CADII PLTD bolts. FILL ALL HOLES. ALL TRANSITION COMPONENTS SHOULD BE LOOSELY INSTALLED AT THIS TIME. **Level the side straps and use the holes in the straps as a guide to mark the barrier where the bolt**

QMB TRANSITION

1.8 Place the strap around the sides of the QMB Attachment Barrier and over QMB hinge assembly. Keep the flat side of the strap on the top.

1.9 Place the Tie Strap Mount end of the strap assembly over the top of the QMB Attachment Barrier hinge as show above.

1.10 Install the Hinge Adapter Plate to the strap assembly with (6) ½" x 1 ½" NC GR5 CADIIPLTD bolts, (6) ½" Nylock Nuts and (12) ½" washers (washers must be used on all slotted holes). The nuts should be on the inside of the plate. After all of the bolts are installed, tighten the bolts with hand tools or an impact wrench.

PCB TRANSITION

holes will be later drilled.

1.12 Now that the Strap Ends are at their final "level" position on the PCB, drill (4) ½" (12 mm) diameter holes, 3¼" (80 mm) deep in the side of the PCB. Install (4) ½" x 4¼" (12 mm x 108 mm) wedge anchor bolts. Place one ½" (12 mm) flat washer and nut on each anchor bolt. DO NOT TIGHTEN.

1.13 Remove the Hinge Plate Adapter that was loosely attached earlier.

1.14 Tighten the Side Strap nuts and bolts on the steel transition housing.

QMB TRANSITION

1.11 Use a suitable forklift and the QMB forklift handling tool to move the QMB Attachment Barrier into place.

1.12 Insert the QMB pin.

1.13 Tap the top of the pin with a pry bar to ensure the pin is fully installed.

Fully installed QMB Attachment Barrier

PCB TRANSITION

1.15 Reinstall the Hinge Plate Adapter, installing bolts with washers right-to-left, top-to-bottom. Do not tighten until all bolts are installed. When reinstalling the plate, the use of a round tapered aligning bar is helpful when placed in the upper left bolt hole during reassembly.

1.16 Properly tighten ALL transition bolts.

1.17 Tighten the anchors on the Side Straps

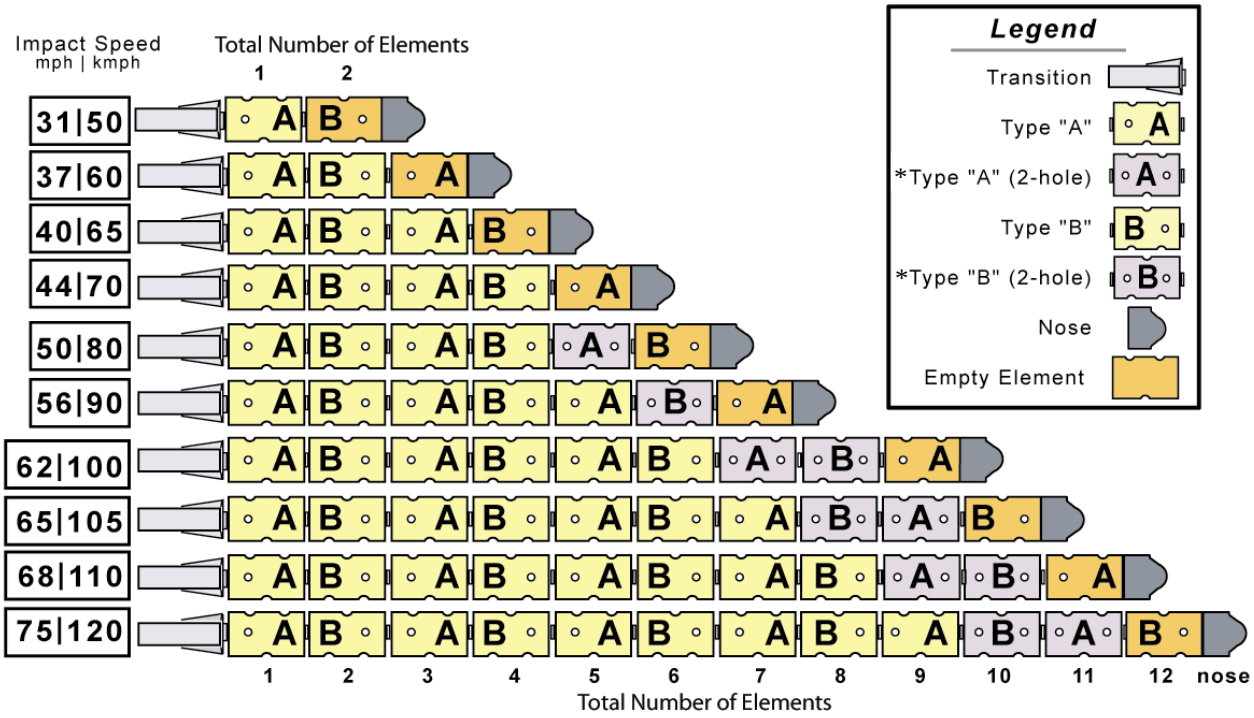
CAREFULLY CHOOSE THE REQUIRED SYSTEM

The ABSORB 350 Crash Cushion system has been fully designed and tested to comply with the evaluation requirements of the National Cooperative Highway Research Program Report 350 (NCHRP 350) for Test Levels 2 (70 km/h) and 3 (100 km/h). The Test Level 2 system contains five (5) Energy Absorbing Elements and the Test Level 3 system contains nine (9) Energy Absorbing Elements.

It is sometimes desirable to have a crash cushion that has an energy absorbing capacity that is less than Test Level 2, between test Level 2 and Test Level 3, or greater than Test Level 3. Therefore, the following table indicates the number of elements and the element placement configuration that would be required to absorb the kinetic energy of a 2000 kg (4400 lb.) vehicle impacting the front of the ABSORB 350 system, head-on and at the velocity indicated.

Roadside safety features such as crash cushions must be installed in accordance with the AASHTO Roadside Design Guide, state and local standards and in conformance with the manufacturer's instructions. Instructions from the manufacturer are available by contacting Barrier Systems, Inc., Customer Service Department at 1 888 800-3691 (Toll Free US) or 1 707 374-6800.

ABSORB 350® System Configuration Chart



*Double hole elements must be cut on site, see page 14.

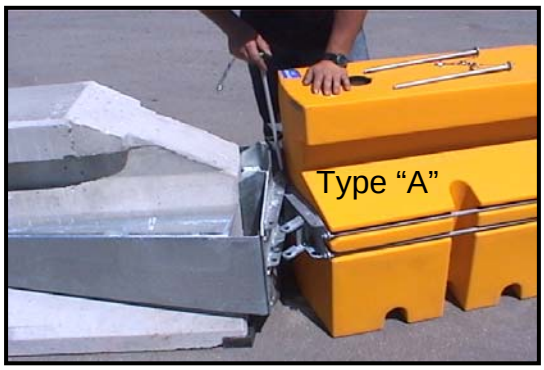
INSTALLATION INSTRUCTIONS FOR ENERGY ABSORBING ELEMENTS

PCB and QMB

INSTALL ENERGY ABSORBING ELEMENTS

There are two types of Energy Absorbing Elements and each type has a forward and rearward end. The forward end is considered the end that faces the Nose Piece. The rearward end faces the Concrete Barrier wall or QMB wall. The two types of elements are identified by the number of vertical indentations along each side in relation to the front and rear hinges. See a picture of the two different elements on page 4 and a hardware diagram on page 15.

When the Absorb 350 system is assembled, it is important to ensure that the two types of elements are **ALWAYS ASSEMBLED IN AN ALTERNATING FASHION** as shown in System Configuration Chart on Page 11. Thus, when you look down either side of the assembled system, you should see an alternating pattern of vertical indentations (i.e. two, one, two, one, etc.).



STEP 1
Install the first Energy Absorbing Element (Type “A”) to the PCB or QMB Hinge Plate Adapter by inserting the pin on each side of the hinge. Make sure that the harness clip on the pin is installed in the small hole located on the hinge next to the pin.

Install the pin with clip

Pin Configuration

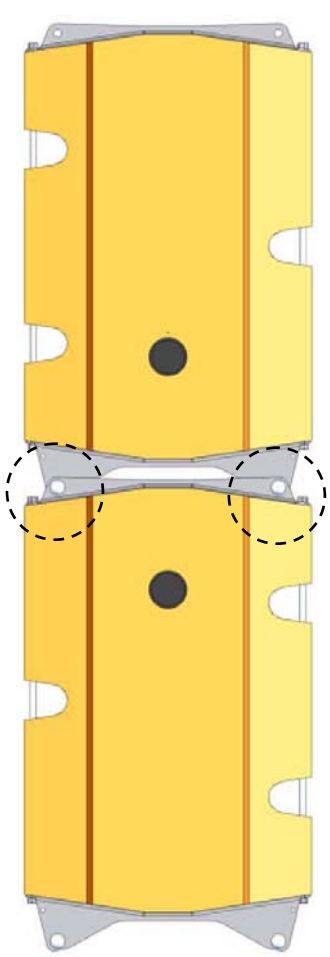
PART MODIFICATION NOTICE

PART: New ABSORB 350 Crash Cushion hinge hardware for Portable Concrete Barrier (PCB) installations.

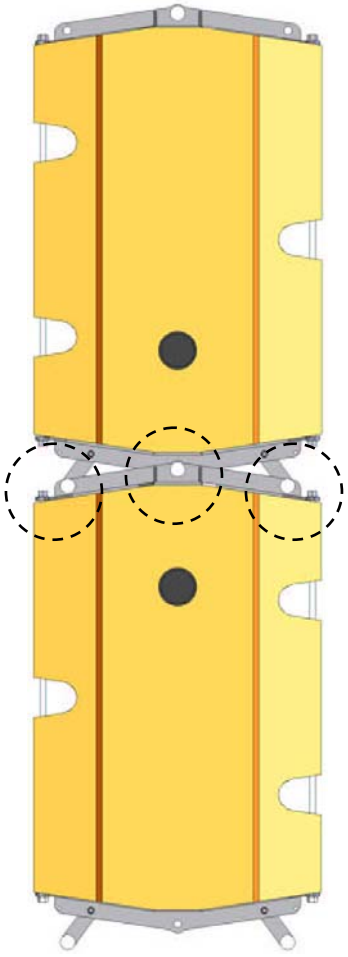
The 2-pin Hinge Hardware for the ABSORB 350 Crash Cushion is specifically designed for use on PCB installations (Figure 1). **The original hinge design can still be used for PCB or Quickchange Moveable Barrier (QMB) applications (Figure 2).** The difference between the old hardware and the new is that there are only two (2) pins used instead of three (3) between the Energy Absorbing Elements (EAE).

The new hardware can be used interchangeably for PCB systems (Figure 3) with the old design but the new design can not be used for QMB installations. The primary difference between the two designs is that the center pin is not necessary for PCB installations.

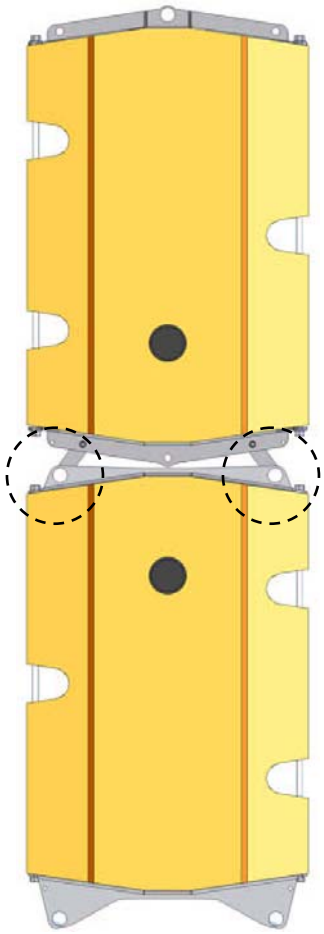
This new hardware has been crash tested and approved by FHWA for NHS use. To request documentation, contact BSI customer service at 888 800-3691 (US) or 707 374-6800.



FOR PCB USE ONLY

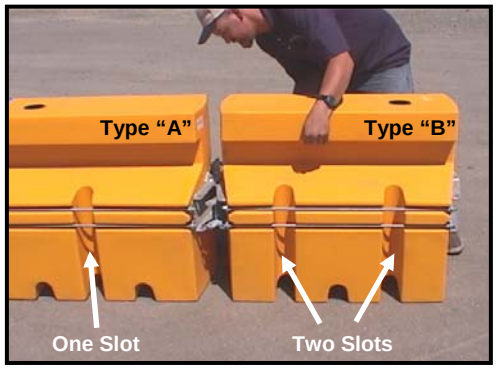


FOR PCB OR QMB USE



FOR PCB USE ONLY

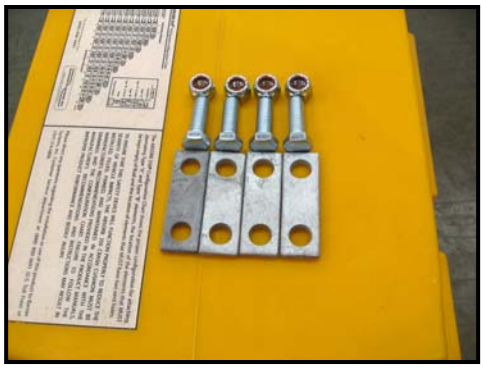
3-pin hinges can be used in conjunction with 2-pin hinges on PCB applications.



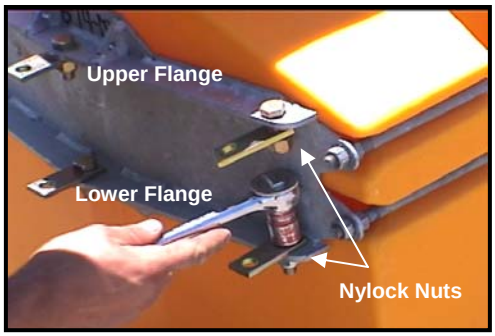
STEP 2
Continue attaching, alternating Type “A” and Type “B” Energy Absorbing Cartridges by repeating Step 1, until the desired system length is reached.

IMPORTANT – DOUBLE HOLE ELEMENTS

On 80 kph systems and above, some elements require two vent/fill holes. Refer to the system configuration chart to determine which elements require two vent/fill holes. The elements are not shipped with two holes; the second hole must be cut in these elements. Cut the second hole on the top of the other end of the element following the hole layout of the existing hole. (FOLLOW THE ELEMENT ORIENTATION EXACTLY AS SHOWN IN THE CONFIGURATION CHART IN APPENDIX B.) The additional evaporation caps for the new holes are shipped in the nose piece box.



STEP 3
Four tabs connect the final Energy Absorbing Element to either a PCB or QMB nose piece. These tabs are the mounting points for the nosepiece. The hardware is packed in the nose piece box.

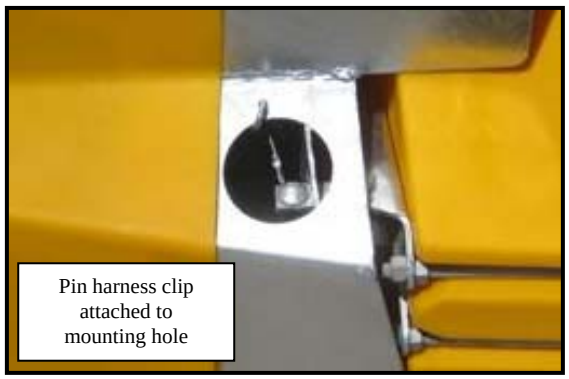


STEP 4
Attach the tabs as shown in the picture above. Before tightening the bolts, align the tabs so that a pin can be inserted from the top, through both of the holes. The upper tabs attach to the bottom side of the top hinge flange and the lower tabs attach to the top side of the bottom flange.


QMB Nose – Slide the corners over final element


PCB Nose – Slide corners over the final element

STEP 5
Align the tabs with the holes located on the inside of the Nose Piece. Slide the PCB or QMB Nose Piece over the hinge tabs. The nose piece will fit over the corners of the Energy Absorbing Element.



STEP 6
Attach the Nose Piece on the end of the final element with the two 3/8" x 15" (10mm x 381mm) pins that link the Nose Piece to the tabs on the hinge assembly. There are three (3) access holes in the Nose Piece (one on top, and one on each side). Use the two side access holes for the installation of these pins. After the pins are installed, attach the pin harness clips to the small mounting hole next to the access holes. It is very important that the Nose Piece does not become detached during an impact.

STEP 7
Before filling the elements with water, align the system elements with the downstream barrier.

STEP 8
Fill all of the Energy Absorbing Elements with water, except the final element. The element that attaches to the nosepiece **must not be filled with water**. Fill the remaining elements with water to a level that is within 2" (50 mm) from the top of the fill hole.

Example:
Only fill 4 elements for Test Level 2 (5 total elements)
Only fill 8 elements for Test Level 3 (9 total elements)

NOTE – FILLING THE ELEMENT ATTACHED TO THE NOSE PIECE WITH WATER WILL CAUSE THE SYSTEM TO PERFORM IMPROPERLY AND MAY CAUSE SERIOUS BODILY INJURY.

In regions where the water filled ABSORB 350 elements could become frozen, proper antifreeze agents should be used. Care should be taken to ensure that proper antifreeze agents are used in accordance with local regulations, environmental concerns and ensuring that any post impact liquid on the road surface does not constitute an undue hazard to adjacent motorists.

Some customers have indicated that common deicing and dust control chemicals that are used on the highway make excellent choices for antifreeze agents. These include:

- Calcium Chloride ($CaCl_2$)
- Calcium Magnesium Acetate (CMA)
- Potassium Acetate (KAc)

After you have selected a state approved product for an antifreeze agent, we recommend contacting your chemical manufacturer to verify the percent of purity and to calculate the amount of chemical needed to achieve the temperature desired.

The ABSORB 350 elements should be inspected regularly to ensure that the elements that are intended to contain water (or antifreeze fluid) are kept at adequate fill levels.

STEP 9
Install the Evaporation Prevention Cap into the top of each plastic element. The cap needs to be securely pushed down to prevent evaporation. In addition, the tie strap should be securely fastened through the hole in the cap and the hole located next to the cap on the top of the element.

INSPECTION
THE METAL COMPONENTS AND FASTENERS OF THE SYSTEM SHOULD BE PERIODICALLY INSPECTED TO ENSURE THAT THE SYSTEM REMAINS INTACT AND ABLE TO PERFORM IN A SAFE AND EFFECTIVE MANNER.

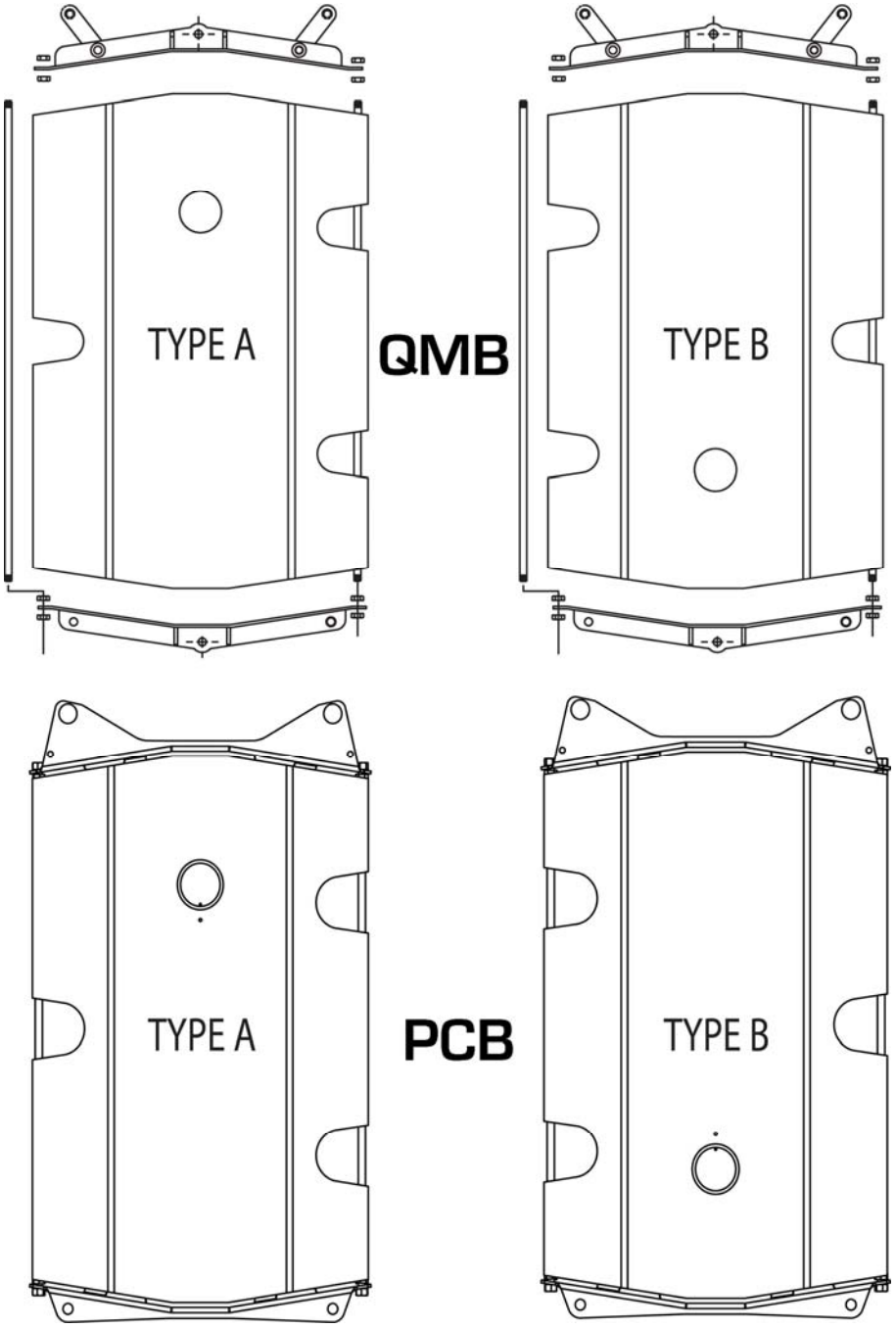
REPLACEMENT OF DAMAGED UNITS

Any component within the system that becomes damaged should be replaced immediately.

CONVERTING A TYPE "A" ENERGY ABSORBING ELEMENT INTO A TYPE "B" ELEMENT

Type A and Type B elements must be installed according to the configuration chart in Appendix B. If necessary, a Type "A" element can be converted to a Type "B" element by simply reversing the plastic within the hinge system hardware.

ABSORB 350 Element Assembly



PREFACE

The Barrier Systems, Inc. (BSI), ABSORB 350 crash cushion system incorporates the newest roadside safety materials and engineering processes.

As with any roadside safety device, the ABSORB 350 system must be properly maintained to insure proper performance. Thoroughly review and fully understand the maintenance instructions and product limitations before performing any maintenance. An instructional video is available from BSI to help explain the general requirements. Do not begin any maintenance operation without the proper plans and tools. For further guidance, refer to the ABSORB 350 Installation portion of this manual.

If you need additional information, or have questions about the ABSORB 350 Crash Cushion, please call the BSI Customer Service Department at (888) 800-3691 (U.S. toll free) or (707) 374-6800.

INTRODUCTION

The ABSORB 350 system has been tested to meet the rigorous requirements of NCHRP Report 350, Test Levels 2 and 3. The systems will be provided in lengths and capacities for both low speed and high speed applications.

The ABSORB 350 system is a non-redirective, gating, crash cushion, and is ideally suited for narrow hazards such as portable, permanent or moveable concrete barrier. Ease of installation, numerous transition options, low maintenance requirements, and reusability of system components make the ABSORB 350 system ideal for treating many roadside hazards.

Non-Redirective, gating, crash cushions are highway safety devices whose primary function is to improve the safety for occupants of errant vehicles that impact the end of rigid or semi-rigid barriers or fixed roadside hazards by absorbing the inertia of vehicle impact or by allowing controlled penetration of the vehicle. These devices are designed to safely decelerate errant vehicles. These types of systems are typically applied to locations where head-on and angled impacts are likely to occur and it is not necessarily desirable to have post impact trajectories on the impact side of the system.

Placement and use of the ABSORB 350 system should be accomplished in accordance with the guidelines and recommendations set forth in the "AASHTO Roadside Design Guide," FHWA memoranda and other state and local standards.

IMPORTANT INFORMATION

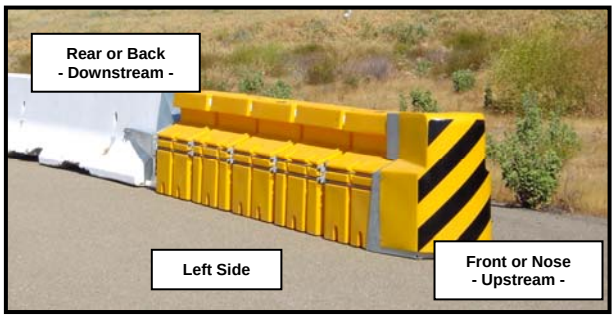
The ABSORB 350 crash cushion must be installed properly to maximize the systems ability to protect errant motorists that impact the system. Designers, installers and people that maintain the system should thoroughly understand the manufacturer's instructions prior to performing any necessary maintenance or repair work. Key information is provided in this Maintenance Manual and important additional information is in the Installation Manual. If these documents are not available, or if there are any questions regarding the proper placement or installation of the ABSORB 350 crash cushion, contact Barrier Systems, Inc., Customer Service at U.S. toll free (888) 800-3691 or (707) 374-6800.

SYSTEM OVERVIEW

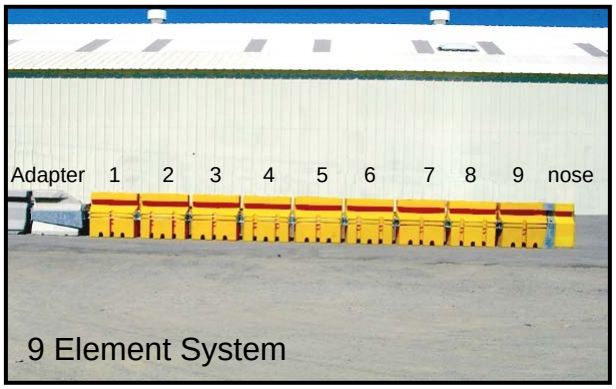
The ABSORB 350 system is designed and constructed to provide acceptable structural adequacy, minimal occupant risk and safe vehicle trajectory as set forth in NCHRP 350 for non-redirective, gating, crash cushions. The ABSORB 350 system is designed to shield the ends of median barriers and other narrow fixed objects likely to be struck head-on, by absorbing and dissipating the inertia of impacting vehicles. ABSORB 350 utilizes disposable water filled Energy Absorbing Elements (EAEs) to absorb the inertia of the impacting vehicle. Only the Energy Absorbing Elements are expended after most head-on impacts.

Sign Conventions

The picture of the ABSORB 350 system below is labeled to show the descriptive terms that will be used throughout this manual.



Element Counting Convention



The picture of the ABSORB 350 system above is labeled to show how the elements are numbered throughout this manual.

Design Considerations

The ABSORB 350 system is a non-redirective, gating system that has been fully tested in conformance with NCHRP Report 350 and approved by the U. S. DOT Federal Highway Administration as well as several countries outside of the U.S. Non-redirective, gating, crash cushions are frequently used at locations where it is desirable for the vehicle post impact trajectories to be behind the system. If it is desirable to have the majority of post impact vehicle trajectories on the impact side of the system, a Redirective, non-gating, crash cushion should be considered.

This section will address several of the other key issues that should be considered in deciding where and how to use the ABSORB 350 crash cushion.

System Length and Width

The length of the ABSORB 350 crash cushion system is determined by the required capacity. The width of the system is 24” (61cm).

System Capacity

The ABSORB 350 crash cushion is available in variable lengths to accommodate frontal impact velocities higher and lower than required in NCHRP Report 350. Appendix B contains a chart that shows the number of options available, the frontal impact speed capacity and element configurations.

Types of Installations

The ABSORB 350 crash cushion can be installed on permanent concrete barrier, portable concrete barrier, portable steel barrier and moveable barrier.

Foundation Options and Considerations

The ABSORB 350 system does not need to be attached to a foundation and can be installed on top of concrete, asphalt or any surface capable of bearing the weight of the system.

Cross slopes of up to 8% (5 degrees or 1:12 slope) can be accommodated with the standard hardware and with the instructions provided with the system. If there are cross slopes in excess of 8%, contact

Barrier Systems, Inc., Customer Service to obtain engineering advice and assistance.

Transition Advisory

The ABSORB 350 crash cushion was designed to be able to used with permanent, portable, or moveable concrete barrier and portable steel barrier. Special care should be taken to ensure that the type of transition system chosen properly addresses the direction of all vehicles that will be exposed to the system.

Other Site Conditions and Considerations

There are numerous other conditions that should be taken into consideration when selecting and locating crash cushions. The majority of these are addressed in the "AASHTO Roadside Design Guide" and in memoranda from the Federal Highway Administration and state Departments of Transportation. These should always be taken into consideration when selecting and locating crash cushions.

A few of the typical considerations are as follows:

- All curbs, islands and elevated objects greater than 4 inches (100 mm) high that would be beneath, beside or less than 50 feet (15 m) in front of a ABSORB 350 crash cushion should be removed prior to installation.

- Ensure that all drainage inlets or structures, junction boxes, expansion joints, sign supports, delineators or any other element that is close to the installation site of the ABSORB 350 system, cannot interfere with the proper operation of the system.

Limitations and Warnings

The ABSORB 350 Non-Redirective, Gating, Crash Cushion has been designed and tested to perform in accordance with the criteria set forth in the National Cooperative Highway Research Program Report No. 350 (NCHRP 350) for devices in this specific category.

It is very important to note that non-redirective crash cushions should be applied to locations where there is not a need for redirection of impacting vehicles and where there is an adequate clear zone adjacent to the system. Other products that have been approved for use in this operational category include sand barrel arrays.

The ABSORB 350 system should be installed and maintained in accordance with the instructions in this Installation and Maintenance manual. Failure to install or maintain the system in accordance with these instructions could result in the system not performing in accordance with the product specifications and severe bodily injury to errant motorists that impact the system.

The system should be filled with a proper fluid and delineated in accordance with the instructions in the Installation and Maintenance Manual, federal, state and local requirements. The federal, state and local requirements will always supercede the instructions in the manual regarding delineation and the type of fluid to be used in the elements of the ABSORB 350 system.

The ABSORB 350 system should always be installed on a firm surface that would prevent the system from becoming embedded in the surface over long periods of time. Debris should be kept clear of the system and no foreign objects should be in close proximity or on top of the system during operation.

The impact performance of the crash cushion systems described in this document have been conducted under controlled conditions. Barrier Systems, Inc. (BSI) does not represent nor warrant that the results of those controlled conditions would necessarily avoid injury to persons or property. BSI expressly disclaims any warranty or liability for claims arising by reasons of death or personal injury or damage to property resulting from any impact, collision or harmful contact with the crash cushion

system or nearby hazards or objects, by any vehicle, objects or persons.

LIMITED WARRANTY

Barrier Systems, Inc. (BSI) has tested the impact performance of its moveable barrier and crash cushion systems under controlled conditions, however, BSI does not represent nor warrant that the results of those controlled conditions would necessarily avoid injury to persons or property. BSI EXPRESSLY DISCLAIMS ANY WARRANTY OR LIABILITY FOR CLAIMS ARISING BY REASONS OF DEATH OR PERSONAL INJURY OR DAMAGE TO PROPERTY RESULTING FROM ANY IMPACT, COLLISION OR HARMFUL CONTACT WITH THE PRODUCTS OR NEARBY HAZARDS OR OBJECTS BY ANY VEHICLE, OBJECTS OR PERSONS.

BSI warrants that any product or component part manufactured by BSI will be free from defects in material or workmanship. BSI will replace free of cost any Product or component part manufactured by BSI that contains such a defect.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

BSI'S LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO REPLACE FREE OF COST (IN THE FORM AND UNDER THE TERMS ORIGINALLY SHIPPED), OR TO REPAIR OR TO MANUFACTURE BY BSI, PRODUCTS OR PARTS NOT COMPLYING WITH BSI SPECIFICATIONS, OR, AT BSI'S ELECTION, TO THE REPAYMENT OF AN AMOUNT EQUAL TO THE PURCHASE PRICE OF SUCH PRODUCTS OR PARTS, WHETHER SUCH CLAIMS ARE FOR BREACH OF WARRANTY OR NEGLIGENCE. BSI SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL LOSSES, DAMAGES OR EXPENSES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ANY SUCH LOSSES, DAMAGES OR EXPENSES ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, HANDLING OR USE OF THE PRODUCTS FROM ANY OTHER CAUSE RELATING THERETO, OR FROM PERSONAL INJURY OR LOSS OF PROFIT.

Any claim by the Buyer with reference to products sold hereunder for any cause shall be deemed waived by the Buyer unless BSI is notified in writing, in the case of defects apparent on visual inspection, within ninety (90) days from the delivery date, or, in the case of defects not apparent on visual inspection, within twelve (12) months from the said delivery date. Products claimed to be defective may be returned prepaid to BSI's plant for inspection in accordance with return shipping instructions that BSI shall furnish to the Buyer forthwith upon receipt of the Buyer's notice of claim. If the claim is established, BSI will reimburse that Buyer for all carriage costs incurred hereunder.

The forgoing warranty benefits shall not apply to (i) any Products that have been subject to improper storage, accident, misuse or unauthorized alterations, or that have not been installed, operated, and maintained in accordance with approved procedures and (ii) any components manufactured by the Buyer.

For additional information regarding this product, please contact:

Barrier Systems, Inc.
Customer Support
3333 Vaca Valley Pkwy, Ste 800
Vacaville, CA 95688

U.S. Toll Free (888) 800-3691
Phone: (707) 374-6800
Fax: (707) 374-6801
www.barriersystemsinc.com

Inspection / Drive-By

The frequency of Drive-By inspections is dependent on the traffic volume and the impact history of the system. ***Drive-By inspections are recommended at least monthly.***

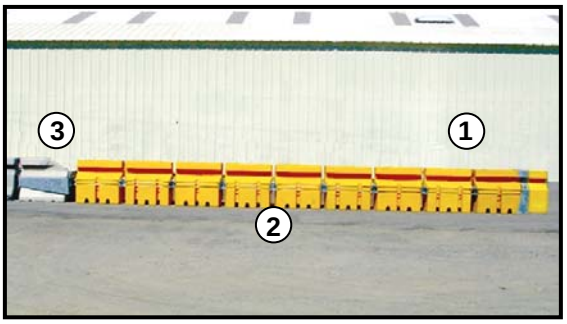
1) The inspector should be moving at a speed that is sufficiently slow enough to detect impact or environmental damage (debris). If any damage is observed, a Hands-On inspection is warranted.

2) Make sure that all of the elements are present and that there is no debris lodged between the elements.

3) If delineation has been applied to the nose cover, make sure that it is still properly applied and visible.

4) If the system appears to have been impacted in any way (scrapes, paint marks, etc.) a Hands-On inspection should be made.

NOTE: It is important to keep a logbook of all Drive-By inspections for each installed system. Record the date of the inspection and observed condition of the system.



1. Look for tire or paint marks on front, side and transition.

2. Look for debris between elements (tire, garbage, etc).

3. Look for transition damage.

Although there may be no obvious damage, paint marks along the side would indicate an impact and the need for a hands-on inspection.

Inspection / Hands-On

The frequency of Hands-On inspections is dependant on the traffic volume and the impact history of the system. ***Hands-On inspections are recommended at least yearly.***

1) Check that all of the elements are straight.

2) Check in the spaces between the Energy Absorbing Elements (EAEs) to remove any debris that may have accumulated.

3) Check the water level in the elements. The water should be within 2" of the top of the element. **THERE SHOULD BE NO WATER IN THE ELEMENT ATTACHED TO THE NOSE PIECE.**

4) Check the condition of and the placement of all Energy Absorbing Elements. Replace any damaged Cartridges. Refer to the chart in Appendix "B" for proper placement.

NOTE: It is important to keep a log book of all Hands-On inspections for each installed system. Record the date of inspection, the observed condition of the system and any replaced items.

Post Impact Inspection – Repairs

After an impact, the system must be thoroughly inspected to determine which parts can be reused and which parts will need to be replaced. The system must be repaired to its original condition to operate properly during the next impact.

1) If the system has sustained an impact, detach the damaged elements by removing the two side pins and properly discard. Replace the damaged element with the same type of element Type "A" or "B".

   NOTE: Due to the possibility of reduced performance, any elements with bent side rods should be replaced.

2) Ensure that the system is re-installed in the proper configuration by referencing the system configuration chart in Appendix "B".

3) Inspect for damage to the bolts that attach the transition. Remove and replace any damaged bolts.

4) Inspect the Nose Piece for damage. Repair or replace the Nose Piece if there is damage, and apply the proper delineation.

5) Make sure that all of the pins are in place on both sides of the system.

APPENDIX A Ordering Instructions

Make a list of the needed replacement parts. Call BSI Customer Service at U.S. toll free (888) 800-3691 or (707) 374-6800.

PCB System	Part #
Nose Piece Assembly	B010825
Transition to PCB	K001056
Type A Element	B030660
Type B Element	B030661
Hinge Pin, Long	A010420

QMB System	Part #
Nose Piece Assembly	B991204
Transition to QMB	B000419
Type A Element	B000303
Type B Element	B000708
Hinge Pin, Long	A010420

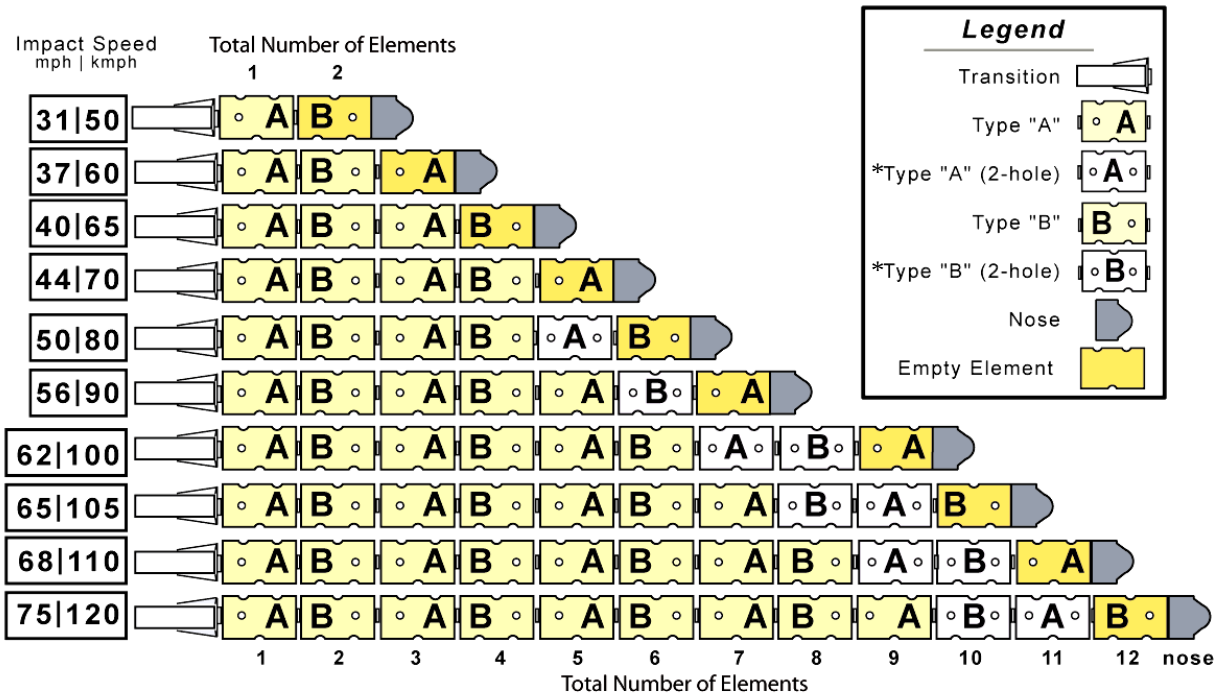
APPENDIX B System Configurations

The ABSORB 350 Crash Cushion system has been fully designed and tested to comply with the evaluation requirements of the National Cooperative Highway Research Program Report 350 (NCHRP 350) for Test Levels 2 (70 km/h) and 3 (100 km/h). The Test Level 2 system contains five (5) Energy Absorbing Elements (EAB) and the Test Level 3 system contains nine (9) Energy Absorbing Elements.

It is sometimes desirable to have a crash cushion that has an energy absorbing capacity that is less than Test Level 2, between test Level 2 and Test Level 3, or greater than Test Level 3. Therefore, the following table indicates the number of elements and the element placement configuration that would be required to absorb the kinetic energy of a 2000 kg (4400 lb.) vehicle impacting the front of the ABSORB 350 system, head-on and at the velocity indicated.

Roadside safety features such as crash cushions must be installed in accordance with the AASHTO Roadside Design Guide, state and local standards and in conformance with the manufacturer's instructions. Instructions from the manufacturer are available by contacting Barrier Systems, Inc., Customer Service Department at 1 888 800-3691 (Toll Free US) or 1 707 374-6800.

ABSORB 350® System Configuration Chart



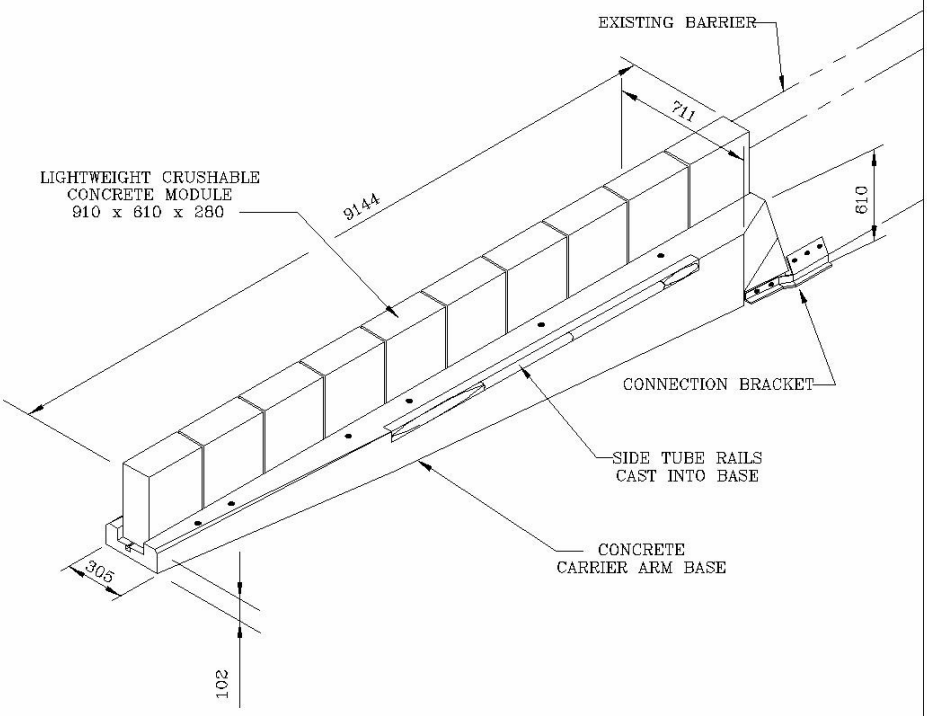
*Double hole elements must be cut on site, see page 14.

ADIEM 350

INSTALLATION & MAINTENANCE

An Economical Crash Cushion for Both Permanent
And Temporary Installations

Trinity Highway Products



2003

ADIEM ENERGY ABSORBING END TREATMENT

TRINITY

SHEET NO.	REF. NO.
1 OF 1	

PRODUT OVERVIEW

The ADIEM 350 (Advanced Dynamic Impact Extension Module) is a high performance, redirecting, energy-absorbing crash cushion and end treatment for portable and permanent protection of concrete barriers, bridge parapet rail, bridge piers and other hazards. The energy absorption elements of the ADIEM 350 are lightly reinforced, ultra low strength perlite concrete modules. The ADIEM dissipates the energy of an impact as the light-weight modules are crushed. All of the modules are identical with no specific order needed during installation.

CRASH PERFORMANCE

The ADIEM 350 has successfully passed the testing requirements outlined in NCHRP Report 350, Test Level 3. A copy of this report can be obtained by contacting:

Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

RECOMMENDED TOOLS AND EQUIPMENT

1. Equipment to safely lift concrete base (30 feet in length and weighing 6 tons).
2. Equipment to off load module pallets without damaging crushable cartridges.
3. Air hammer/drill 35/50# along with appropriate power source.
4. Rock drill bit 1 3/8” x either 36'', 42”, or 48” depending on installation surface.
5. Rock drill bit 1 1/4” x 12”.
6. Heavy sledge hammer.
7. Common motor oil or grease.
8. Socket and ratchet set 1 1/8” and 7/8”.
9. Wrenches 1 1/8” and 7/8”.
10. Standard caulking gun along with “liquid nails” adhesive cartridge.
11. Traffic control equipment.
12. Gloves and safety goggles.
13. Spray paint or chalk for marking anchor holes.
14. Safety gear for back protection when lifting.
15. Common mechanic’s “creeper” or other rolling device for moving modules.
16. Module installation strap (2” wide x 20’ long).
17. Large paint brush.
18. Bolt Cutters.
19. Heavy shop broom.

OFF LOADING ADIEM 350

Always use caution when working with construction equipment. Please wear safety goggles/glasses and gloves at all times while handling ADIEM 350 materials.

Handling the ADIEM 350 Module Packages

The ADIEM 350 modules are packaged ten (10) modules per pallet. The modules are covered with a durable cardboard and stacked back to back five (5) high. *NOTE: The ADIEM module is designed to crush when impacted by a foreign body. Use caution when handling the modules!* Use caution if using a box opener or other sharp edge to remove cardboard- if penetrated too deeply the module can be damaged! The recommended method for off loading the module packages is by forklift. Be careful not to damage modules with fork when establishing lift point! If using something other than a forklift (such as a crane sling) be certain the modules are secure and remain plumb during all times. Do not unpackage the modules until you have the ADIEM 350 base secure and are ready to start installing modules. Be aware of the environment around the modules, look for potential equipment (such as tractors, trucks, etc…) which might inadvertently damage the modules. Be sure to store the modules in a covered area away from heavy traffic that might allow the modules to be damaged.

Handling the ADIEM 350 Precast Concrete Base

The precast concrete base is 30 feet long and weights approximately 6 tons. There are lifting points strategically placed (see drawing SS 349) to allow the base to be balanced while lifting. The recommended method for off loading the base is by forklift (forks must be able to spread to minimal 5' and handle minimal 24" wide base). This allows the installer to use one optimal piece of equipment to handle both the modules and the base. However, the base can be easily off loaded using any crane or piece of equipment capable of lifting such a load. If using something other than a forklift be certain to use a sling apparatus in the lifting points. Using a chain is not recommended because of chips and damages to the base. The ADIEM 350 base is made of durable concrete and can be stored in any safe location covered or uncovered.

Handling the ADIEM 350 Hardware Crate Package

The hardware typically will be packaged inside an open crate or strapped to a pallet. This package can be unloaded with the same equipment used to lift the base or module pallets.

Checking the Shipment
Upon receipt of the shipment verify that all the parts listed on the bill of lading match what is on the truck. Using a pen physically check each part off the list, If any shortage or discrepancy exists clearly note it on the bill of lading. If you have a question about any part description call Trinity customer service.

INSTALLATION

Establishing Correct Anchorage
The ADIEM 350 can be installed on three different surfaces: asphaltic concrete, Portland cement concrete, base and/or compacted soil. ***NOTE: The ADIEM 350 cannot be installed on loose soil surfaces.*** The anchor hardware is different for each surface. Once you have established the installation surface be certain the hardware set matches what is needed (see anchor pin layout on page 5).

The standard ADIEM 350 hardware package is designed for protecting Jersey barrier (24" barrier base width/ level plane for the bottom of the ADIEM base and barrier). There are an infinite variety of bracket attachments differing from the standard. If you are attaching to something other than the standard Jersey Barrier, special attachment brackets will need to be used. Verify that the attachment brackets match what is needed (see *ADIEM 350 Placement* below).

ADIEM 350 Base Placement
Find drawing SS 350 in the appendix. This drawing is meant to be used in conjunction with the project drawings. Note the four typical conditions that exist for ADIEM 350 installations. It is recommended that the installer establish exact placement *prior* to beginning the equipment set up to place the ADIEM 350 base. This will limit traffic exposure as well as costly equipment rentals. The ADIEM 350 must be placed in such a manner to prevent any potential reverse angle "snagging" or exposure to the hazard being protected. The ADIEM 350 should be offset so that the unit clearly has a smooth transition on the traffic side, while not allowing exposure on the reverse angle. ***Warning: incorrect placement could result in the system being improperly positioned, hindering proper performance under the guidelines of NCHRP 350. Contact a Trinity technical representative if clarification is needed.***

Once proper placement of the ADIEM 350 is established it is time to note the correct layout of the anchor pins and attachment hardware. Once again it is recommended that the installer establish proper layout *prior* to beginning the equipment set up to place the ADIEM 350 base. Regardless of which installing surface is being used ADIEM 350 anchor pins are always installed with the shortest pins going to the nose (front of the unit), and increasing in length toward the back (barrier end) of the base. This is referenced on drawing SS 349 located in the appendix. See Table A on page 5 to establish correct anchor pin placement. It is helpful to have drawing SS 349 to reference when reviewing this chart.

Table A (Anchor Pin Layout)

Installation Surface	Front Four Anchor Pins	Middle Four Anchor Pins	Back Four Anchor Pins
Portland Cement Concrete	1" x 18" Pin Part #5643G	1" x 24" Pin Part #5646G	1" x 36" Pin Part #5650G
Asphaltic Concrete	1" x 24" Pin Part #5646G	1" x 30" Pin Part #5641G	1" x 42" Pin Part #5642G
Base and/or Compacted Soil	1" x 30" Pin Part #5641G	1" x 36" Pin Part #5650G	1" x 48" Pin Part #5665G

After establishing the correct anchor pin layout check to be sure that all anchor pin hardware and attachment bracket hardware is readily accessible. *After* establishing a safe workzone it is time to move the precast concrete base into the anchoring position. Refer to page three "Handling the precast concrete base" for questions about off loading. Referencing the project drawings along with drawings SS 349 and SS 350 properly align the ADIEM 350 base. The base should be firmly placed against the surface being protected with no gap allowed. **Do not Remove the ADIEM 350 base handling equipment**, the base may have to be moved during the anchor installation. Continue on to the anchor pin installation section.

Anchor Pin Installation

After it is established that the unit is in position and properly aligned, anchor rods can be placed at the appropriate holes per table A above. If the installation surface is compacted soil/base or asphaltic concrete there is the possibility that the pins can be driven without drilling the surface. If that is the case then check to be sure the bracket hardware is going to line up correctly as the unit is placed. A good method to use is positioning the brackets in the bracket offset points and making sure the bracket fits flush with both the precast concrete base and the surface being protected. Adjust the base as needed to allow the attachment bracket to fit correctly. If the surface will allow the anchor pins to be driven (such as soft asphalt or base/compacted soil) then begin driving the pins using the heavy sledge hammer. Be sure the pins are driven full length.

INSTALLATION

If the installation surface is Portland cement concrete then mark (using spray paint or chalk) the pattern where the anchor holes are located. Remove the concrete base and using the 1 3/8" rock bit drill the anchor holes. Move the precast concrete base back into place, be sure the brackets are still correct, and then drive the anchor pins full length.

Bracket Installation

Be sure to read the mixing instructions provide with the epoxy chemical grout system and comply with the manufacturer's warnings and recommendations. When attaching the ADIEM 350 bracket it is helpful to realize that the front half of the bracket (the part that will attach to the precast concrete base) will always be the same regardless of the site conditions. That portion of the bracket is constructed of 3" x 5" angle and is easily identified by the two 1 3/8" holes matching the precast base pattern (reference SS 349). Find the two brackets necessary to attach the base to the barrier (or whatever is being protected). Place the brackets on each side of the base and attach to the base using the two 1 1/8" x 25" Hex Bolts (part #5052G) an the 1 1/8" wrench and ratchet set. The part of the bracket that attaches to the barrier has four holes for anchoring, pick any three holes to be used. An extra anchor hole is available in case reinforcing steel is encountered while drilling. Using the 1 1/4" rock bit drill the three anchor holes, mix and inject the epoxy system, insert the 7/8" x 6" all thread rod (part #4616G), then allow appropriate time for the system to harden. Once the epoxy system has hardened use the 7/8" washer (part #3725G) and 7/8" hex nut (part #3735G) to secure the bracket to the barrier (or whatever is being protected). No special torque tooling is required, simply adjust to a "snug" fit using the 1 1/8" wrench and ratchet set.

ADIEM 350 Module Placement

Refer back to section one on page three "Handling the ADIEM 350 module packages." Be sure there are no questions about this section. After the module pallet has been off loaded remove the protective cardboard covering, and any plastic wrapping. The modules are stacked with the "feet" (S3 x 5.7# beams) of the module facing out. The "feet" are cast in hard concrete and will remain rigid at all times in order to secure the module to the track in the precast base. **When lifting ADIEM modules use back bracing and correct lifting techniques to prevent injury. The modules weigh approximately 175# each and should not be handled by one individual at a time.** Using the motor oil or grease lubricant that track so that friction is at a minimum when sliding modules up the track. It might be necessary to lift up on the module to relieve any tackiness between modules.

Do this by taking the palm of the hand and grasping each module “foot” and lifting the module. Most installers prefer to manually lift the modules; however, if that is not feasible a strap, or hoist can be used to lift the module by the “feet” only. The module should be lifted using two men positioned on each side of the module. Lift the module and gently place it (feet down- just like it will be installed on the track) on the mechanic’s “creeper” or other rolling device. Both men should stay on each side of the module for balance- the module will be top heavy so it must be held tightly. Discard the thin foam sheet that separates each module. Roll the module to the front of the precast concrete base. Another option is to disregard the rolling concept and just carry the module to the base (using sage lifting technique). Note how the l-beam “feet” will fit inside the rollformed track of the base. Lift the module and slide the module up the track until both feet are in the track. All the modules are identical with no front or back, so no particular sequence is necessary. The same two men should position themselves on each side of the base. Take the 2” module strap and position it toward the bottom two inches of the module, running the ends out toward the two previously positioned men. ***Note that the bottom 2-3” portion of the module is made of hard concrete- any pressure should be directed at that layer.*** Pull the module up the track until it becomes awkward, then push up the track applying pressure only to the bottom 2-3” portion of the module. The module should fit flush at the back of the base. Another option is to disregard the strap and push (bottom 2” layer only) the module up the track from the beginning (using safe technique). Repeat this process with all ten modules. Be sure that the modules fit tight against each other. After the modules are all installed use the brush and the ADIEM coat to completely recoat all modules. The coat should be brushed or applied heavily to any areas where the coating was “bruised” or damaged during the installation process. Any spot where it appears the coating might be penetrated should be heavily coated.

Delineation

Reference drawings 5904B and 5914B in the appendix. Note that drawing 5904B is for roadside left and right delineation needs (with two required), while drawing 5914B is for a “gore” application with both left and right delineation. Using the caulking gun apply “liquid nails” adhesive, and install the delineator per the instructions on the appropriate drawing. The ADIEM 350 is ready for operation. As with all safety products proper maintenance is critical to future success. Please read through the maintenance section and distribute to the appropriate maintaining agency.

MAINTENANCE

Proper maintenance is critical to long term success with any roadside safety product. It is difficult to establish rigid guidelines for how often maintenance is required with so many variables involved. Each specifying agency should carefully consider all variables to establish how often maintenance is required. However, when considering varying conditions it is recommended that the ADIEM 350 have a complete inspection *at least* on an annual basis and a Visual inspection *at least* once every three months.

Visual Inspection

The purpose of the visual inspection is to establish the general conditions of the unit. This inspection can be done during a slow drive-by in a vehicle, or during a brief field visit. Of course, always consider the safety of other traveling motorists while viewing the unit. If a brief field visit is chosen appropriate traffic control should be established to guarantee the safety of the inspectors. The date of the inspection should be noted and records of condition field. During the visual inspection the following questions should be addressed:

1. *Does the unit appear to have been hit recently?*
   If the unit has been hit detailed repairs need to be made immediately. Follow the post impact instructions located on page ten.

2. *Is any vandalism apparent that might prevent proper performance?*
   Look for any debris (lumber, tires, etc…) that might have been thrown against the unit which might alter proper performance. The ADIEM 350 should be clear of all debris while operational. Look for any damage to the modules such as knife cuts or other intentional damage. If the module appears to have been vandalized in any way a complete inspection is needed. Look at the attachment brackets- are all the nuts still attached to the bracket attachments? If not a complete inspection is needed. Look at the delineator- is it still attached securely to the first module? If not, a complete inspection is needed.

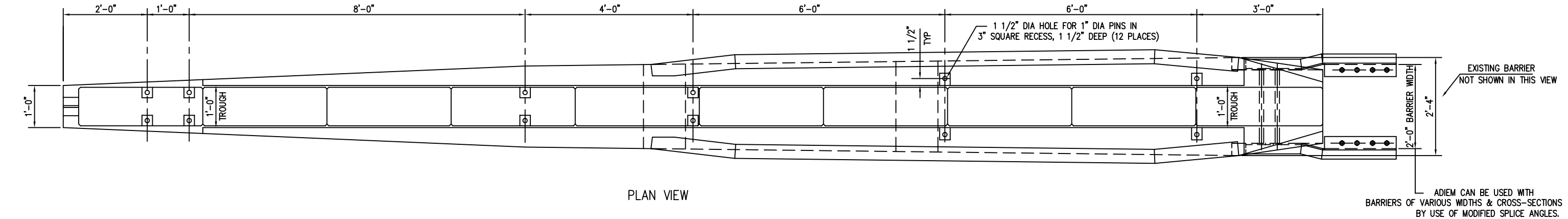
3. *Does the coating appear to be secure to the module?*
   Look for any spots where the coating appears to be peeling or cracking. If the bond on the coating is visually breaking in any way a complete inspection is needed. The surface of the modules should be uniform in texture, if the surface appears to be distorted in any way from the original condition, a complete inspection is needed.

MAINTENANCE

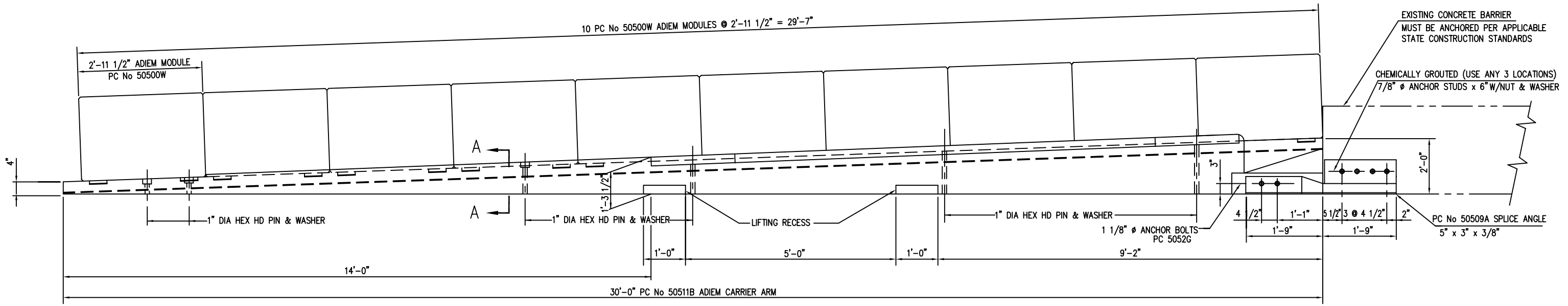
Complete Inspection

The purpose of the complete inspection is to establish the specific condition of the unit. This inspection should be done out of a vehicle. The required tools will be the same as those used when installing the ADIEM 350. Once again appropriate traffic control should be established to guarantee the safety of the inspectors. The date of the inspection should be noted and records of condition filed. During the complete inspection the following steps should be followed:

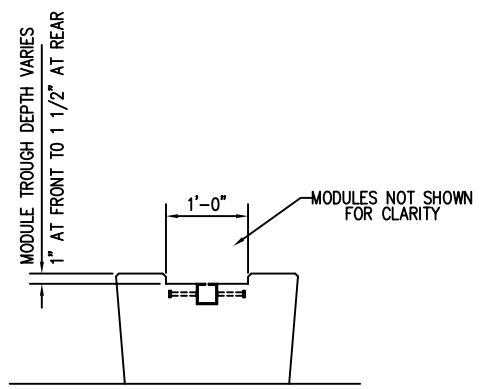
1. Examine the unit for possible impact damage. If the unit has been hit repairs need to be made immediately. Follow the post impact instructions located on page ten.
2. Verify that the ADIEM 350 base is aligned as was originally intended. If adjustments need to be made refer back to the base placement instructions in the installation section. If the base appears to have any chips or cracks repair per the base repair instructions located in the appendix.
3. Check all of the nuts at the attachment brackets. If any nuts are missing new ones should be ordered. Make sure all the nuts are tight.
4. Check that all of the anchor pins are still driven full length. If any have shifted use the heavy sledge hammer to drive flush.
5. Check the condition of the ADIEM 350 modules. It is recommended that the modules be recoated with ADIEM coat annually regardless of condition. This will help to extend the life of the modules. ADIEM coat should be applied in dry conditions and allowed to dry for 24 hours (see ADIEM coat application instructions in the appendix). If the coating appears to be losing the bond with the module, but the surface of the module is consistent and in good condition, then remove any loose materials, clean with a moist sponge, and recoat the entire module per ADIEM coat instructions in the appendix. If the coating appears to be losing the bond with the module, and the module surface appears to have inconsistencies, repair per the module repair procedures located in the appendix. If the reinforcing cage on the module is visual the module needs to be replaced immediately.
6. Check that the delineator is secure and in place on the front of the first module. Repair or replace as necessary following the delineator section under installation.



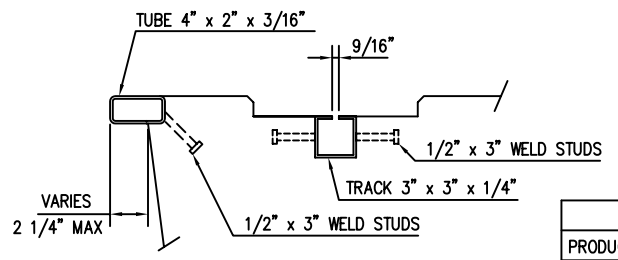
PLAN VIEW



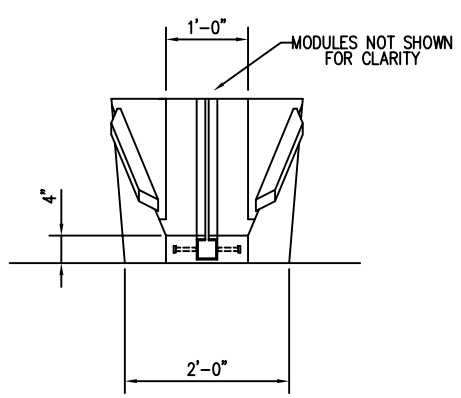
ELEVATION VIEW



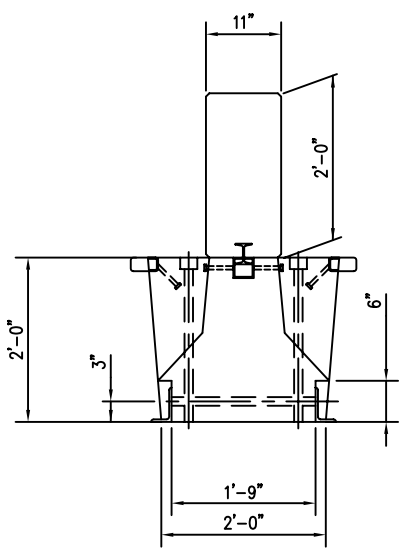
SECTION A-A



TRACK & BUMPER DETAIL



FRONT ELEVATION VIEW



REAR ELEVATION VIEW

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION	REMARKS
50500W	10	MODULES x 2'-11 1/2"	
50511B	1	BASE x 30'-0"	
50508A	1	SPLICE ANGLE x 3'-6" RT	
50509A	1	SPLICE ANGLE x 3'-6" LT	
6549W	1	GARNA-THANE COATING (1 GAL)	
5052G	2	1 1/8" ø x 25" HEX HD BOLT	
4963G	4	1 1/8" WASHER	
3976G	2	1 1/8" HEX NUT	
4616G	6	7/8"ø STUD x 6" (FULL THD)	
3725G	6	7/8" WASHER	
3735G	6	7/8" HEX NUT	
☆ 5206B	1	ADHESIVE HY150 CARTRIDGE	
3900G	12	1" WASHER	

PRODUCT CODE	QTY	DESCRIPTION	REMARKS	ANCHOR PIN SCHEDULE PER SURFACE (SEE NOTES 1-5) PCC	ACP	BASE
5665G	SEE SCH	1" ø HEX HD PIN x 48"	SEE NOTES 1-5			4
5642G		1" ø HEX HD PIN x 42"			4	
5650G		1" ø HEX HD PIN x 36"		4		4
5641G		1" ø HEX HD PIN x 30"			4	4
5646G		1" ø HEX HD PIN x 24"		4	4	
5643G		1" ø HEX HD PIN x 18"		4		

☆ EACH CARTRIDGE INCLUDES 1 EACH : MIXER HY 150 CARTDIDGE(NOZZLE)
: FILLER HIT HY 150 (FILLER TUBE)

NOTES:
1) ANCHOR PINS ARE 1" DIA HEX HD, POINTED, GALV RODS (A307)
2) PORTLAND CEMENT CONCRETE (PCC)
3) ASPHALTIC CONCRETE (ACP)
4) BASE AND/OR COMPACTED SOIL (BASE)
5) ADIEM INSTALLATION NOT RECOMMENDED ON LOOSE SOIL.

ADIEM INSTALLATION INSTRUCTIONS

1. The ADIEM base is to be placed on a smooth surface (the same horizontal plane as the concrete barrier) and parallel to the mainline or ramp traveled lane(s).
2. Install anchor rods for ADIEM base by driving in soil or soft asphalt or driving in pre-drilled holes for hard asphalt or concrete (no epoxy required). The base should not be moved after the holes are drilled. The holes should be drilled using, at a mininum, a 35# hammer and minimum 36 inch long drill bit. (A 50# hammer is recommended.)
3. Attach connection brackets to base with two (2) 1 1/8" X 25" hex head bolts provided. Then field drill holes in the existing barrier and attach connection brackets to it with chemically grouted hardware provided.
4. Oil the ADIEM base track. Slide the modules onto the base. Be careful not to damage edges of the modules while sliding onto the base.
5. If the modules are scuffed or nicked, apply GARNA-THANE coating to the affected area.
6. Recommended tools and equipment:
   - 35/50# air hammer/drill
   - 1 3/8" ø x 36" rock drill
   - 1 1/4" ø x 12" rock drill
   - Sledge hammer
   - Oil
   - Wrenches

OPTIONAL ANCHOR ITEMS	
PRODUCT CODE	DESCRIPTION
5205B	ADHESIVE DISPENSER
5207B	MIXER HIT HY150 (NOZZLE)
5208B	FILLER HIT HY150 (FILLER TUBE)
5209B	BIT TE-C+ 11/16-18 (11/16" ø BIT)

ALTERNATE ADIEM INSTALLATION INSTRUCTIONS

1. At a holding site, the modules are slid into the ADIEM base after oiling the base track. Be careful not to damage the edges of the modules while sliding them onto the base.
2. If the modules are scuffed or nicked, apply GARNA-THANE coating to the affected area.
3. The unit is then delivered to the job site. The unit is to be placed on a smooth surface (the same horizontal slope as the concrete barrier) and parallel to the mailine or ramp traveled lane (s).
4. The front module should be removed so the remaining modules can be shifted for easy access for drilling the anchor rod holes.
5. Install anchor rods for ADIEM base by driving in soil or soft asphalt or driving in predrilled holes for hard asphalt or concrete (no epoxy required). The base should not be moved after the holes are drilled. The holes should be drilled using, at a minimum, a 35# hammer and a minimum 36 inch long drilling bit. (A 50# hammer is recommended.)
6. Attach connection brackets to base with two (2) 1 1/8" X 25" hex head bolts provided. Then field drill holes in the existing barrier and attach connection brackets to it with chemically grouted hardware provided.

REV.	CHK'D	BY	DATE	REMARKS
6	B.T.	L.H.	12/10/03	REPLACED GROUT WITH HILTI, UPDATED DWG
5		L.H.	03/12/03	DELETED NOTE #7, REVISED NOTE #3
4	D.D.	L.H.	12/17/99	REVISED COATING, CHANGED TITLE BLOCK
3		BT	3-14-97	DELETED PC 5484, ADDED PC 5052, CHG QTY PC 3976
2		BT	2-14-97	GENERAL UPDATES

ADIEM 30'

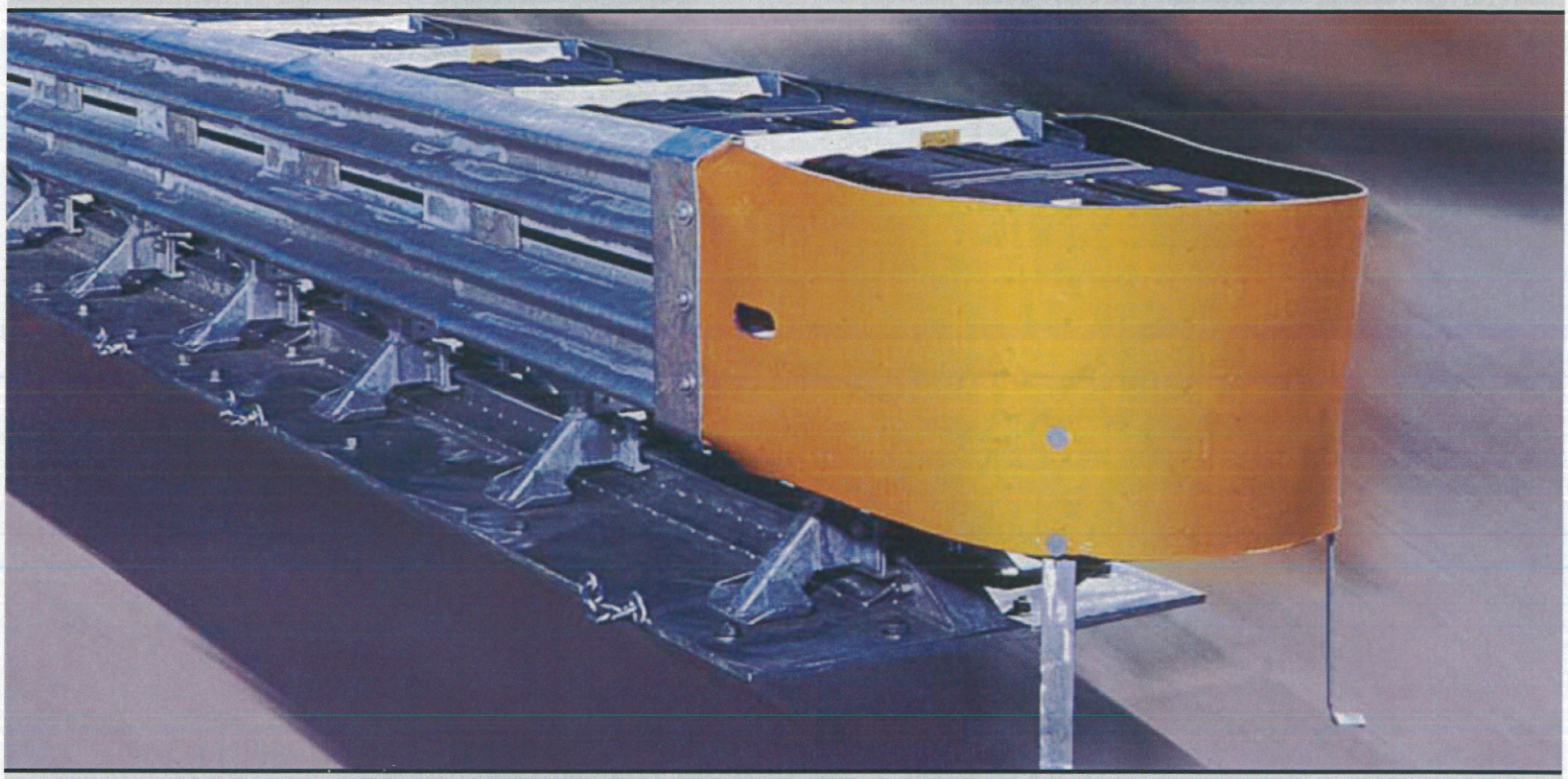
ERECTION DETAILS

TRINITY INDUSTRIES, INC.
HIGHWAY SAFETY PRODUCTS
2525 STEMMONS FREEWAY, DALLAS, TX 75207

DRAWN	B.TAKACH
CHECKED	D.D.
APPROVED	
DATE	3/19/96
ENG. FILE #	SS349-01E
SHT.No.	E1 OF 1
DRAWING NO.	SS 349
REV.	6

QUADGUARD® CZ SYSTEM

PORTABLE NON-GATING REDIRECTIVE CRASH CUSHION FOR WORK ZONES



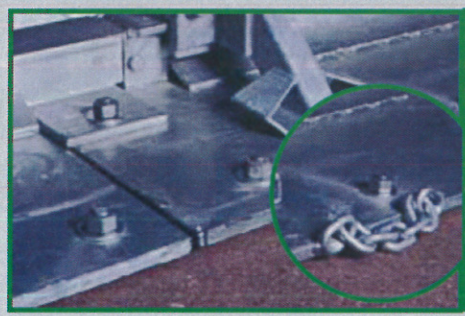
OVERVIEW

The innovative QuadGuard CZ System has been improved with the addition of modular plate bases to reduce anchorage and speed installation. The QuadGuard CZ System meets all of today's strict crash cushion performance criteria. The QuadGuard CZ System provides the same lifesaving efficiency and features of the permanent QuadGuard System, in a compact, portable system that is easier than ever to install.

During head-on impacts, the QuadGuard Systems telescope rearward and crush the cartridges to absorb the energy of impact. When impacted from the side at angles up to 20°, the QuadGuard Systems safely redirect the errant vehicle back toward its original travel path without allowing gating.

FEATURES AND BENEFITS

- NCHRP 350 TL-3 performance requires only 30 anchors
- Compact, modular design can accommodate speeds from 70 km/h (45 mph) to 115 km/h (71 mph)
- 80% reusability after most design impacts
- Lifting points allow easy repositioning as a complete unit
- Easy to access anchor holes allow for fast installation
- Available in 610, 762 & 910 mm (24, 30 & 36 in.) widths to protect a wide array of hazards



Modular plate base reduces anchorage and speeds installation

Built-in lifting points allow the system to be moved as a complete unit

ENERGY ABSORPTION SYSTEMS, INC.

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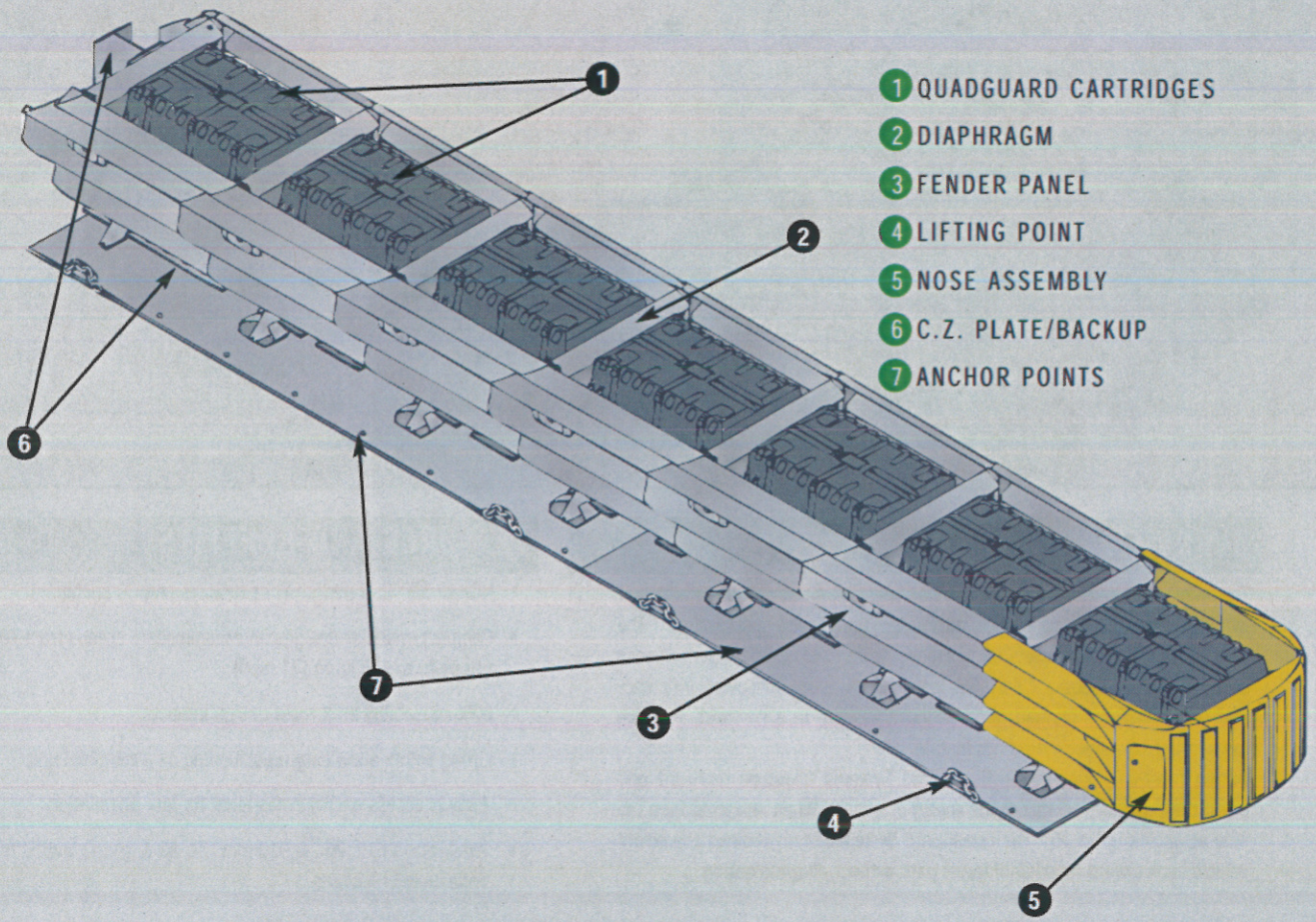
QUICK & EASY INSTALLATION & REMOVAL

- Only 30 anchor bolts needed for TL-3 six bay unit
- Easy access to anchor holes
- Entire system can be moved as a single unit using lifting points

SPECIFICATIONS

Minimum Width at Backup	610.0 mm	(2')
Maximum Width at Backup	915 mm	(3')
Weight (typical 6-bay unit)	1594.0 kg	(3512 lb.)
Length (typical 6-bay unit)	6.4 m	(21')



1. QUADGUARD CARTRIDGES
2. DIAPHRAGM
3. FENDER PANEL
4. LIFTING POINT
5. NOSE ASSEMBLY
6. C.Z. PLATE/BACKUP
7. ANCHOR POINTS

Quixote
Transportation Safety

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ENERGY ABSORPTION
SYSTEMS, INC.

35 East Wacker Drive • Chicago, IL 60601
Tel: (312) 467-6750 • Fax: (312) 467-9625
www.energyabsorption.com

Distributed By:

General specifications for the QuadGuard System are subject to change without notice to reflect improvements and upgrades. Additional information is available in the Product Manual for this system. Contact Energy Absorption Systems for details.

CONTENTS

DESCRIPTION	DRAWING NUMBER/SHEET NUMBER
QUADGUARD CZ SYSTEM ON A PLATE	60-24-93 / 1 of 4
CZ ON A PLATE, MP-3 ANCHOR KIT, QG, 3 BAY B/U, 3 BAY ADAPTOR PLATES	60-24-93 / 2 of 4
CZ ON A PLATE, MP-3 ANCHOR KIT, QG, 3 BAY B/U, 3 BAY ADAPTOR PLATES 24" & 30" SYSTEMS	60-24-93 / 3 of 4
CZ ON A PLATE, MP-3 ANCHOR KIT, QG, 3 BAY B/U, 3 BAY ADAPTOR PLATES 36" SYSTEM	60-24-93 / 4 of 4
QUADGUARD SYSTEM DIAPHRAGM ASSY., QG	35-40-07 / 1 of 1
QUADGUARD SYSTEM NOSE ASSY., QG	35-40-05 / 1 of 1
QUADGUARD SYSTEM FENDER PANEL ASSY., QG	35-40-04 / 1 of 1
QUADGUARD SYSTEM 24 & 30 BACKUP ASSY., CZ, PORTABLE, QG	35-40-28 / 1 of 2
QUADGUARD SYSTEM 36 BACKUP ASSY., CZ, PORTABLE, QG	35-40-28 / 2 of 2
QUADGUARD SYSTEM CZ ON A PLATE, QG, LIFTING KIT & INSTRUCTIONS	35-40-23 / 1 of 1
QUADGUARD SYSTEM CZ ON A PLATE FOR CONSTRUCTION ZONES W/DRIVABLE PILE ANCHORAGE	QPCZDPA-U/1 of 1
QUADGUARD SYSTEM CZ ON A PLATE DRIVABLE PILE ANCHOR (DPA) ASSEMBLY	35-40-70/1 of 1

NOTES FOR QUADGUARD CZ SYSTEM ON A PLATE

1. The energy absorbing system represented on this Qualified Products List (QPL) drawing is a proprietary design by Energy Absorption Systems, Inc. and marketed under the name Quadguard CZ System On A Plate. Any infringement on the rights of the designer shall be the sole responsibility of the user.

2. The Quadguard CZ System On A Plate is for temporary use and is limited to construction zones. The system may be used at any location where a temporary redirective crash cushion is called for in the plans.

3. The Quadguard CZ System On A Plate is a redirective, non-gating crash cushion.

4. The Quadguard CZ System On A Plate may be configured for design speeds up to 70 mph.

5. The Quadguard CZ System On A Plate shall be installed in accordance with the manufacturer's details, drawings, procedures and specifications as referenced in these drawings. The Contractor shall certify that all materials furnished meet the specified requirements. Temporary Concrete barrier walls abutting the Quadguard CZ System On A Plate must be adequately anchored for proper impact performance in accordance with Index No. 415.

6. Length of need and transitions shall be in accordance with the respective Quadguard drawings in the Design Standards or posted on the QPL.

7. The number of bays to be used in a specific unit will be determined by the design speed, except where the Engineer determines another speed is more applicable.

8. A yellow Type I object marker shall be centered 3' in front of the nose of the Quadguard CZ System On A Plate. Mounting hardware shall be in conformance with Index Nos. 11860 and 11865. The cost of the object marker shall be included in the cost of the Quadguard CZ System On A Plate.

9. The drivable pile anchor system may be used as an alternative to the other foundation options shown. The cost of the drivable pile anchor system shall be included in the cost of the Quadguard CZ System On A Plate.

10. Temporary Quadguard CZ System On A Plate units will be paid for under the contract unit price for Impact Attenuator-Crash Cushion (Temporary) (Redirective Option), LO.

NOTE 8 ALTERNATIVE:

The contractor has the option to install reflective sheeting on the nose of the crash cushion in lieu of placing the yellow Type I Object Marker 3 feet in front of the nose of the crash cushion. The sheeting to be used must be solid yellow, Type III or better, and must be a product listed on the Department's Qualified Products List (QPL). The sheeting to be applied to the nose of the crash cushion shall be a minimum of 360 square inches with a minimum height of 15 inches.

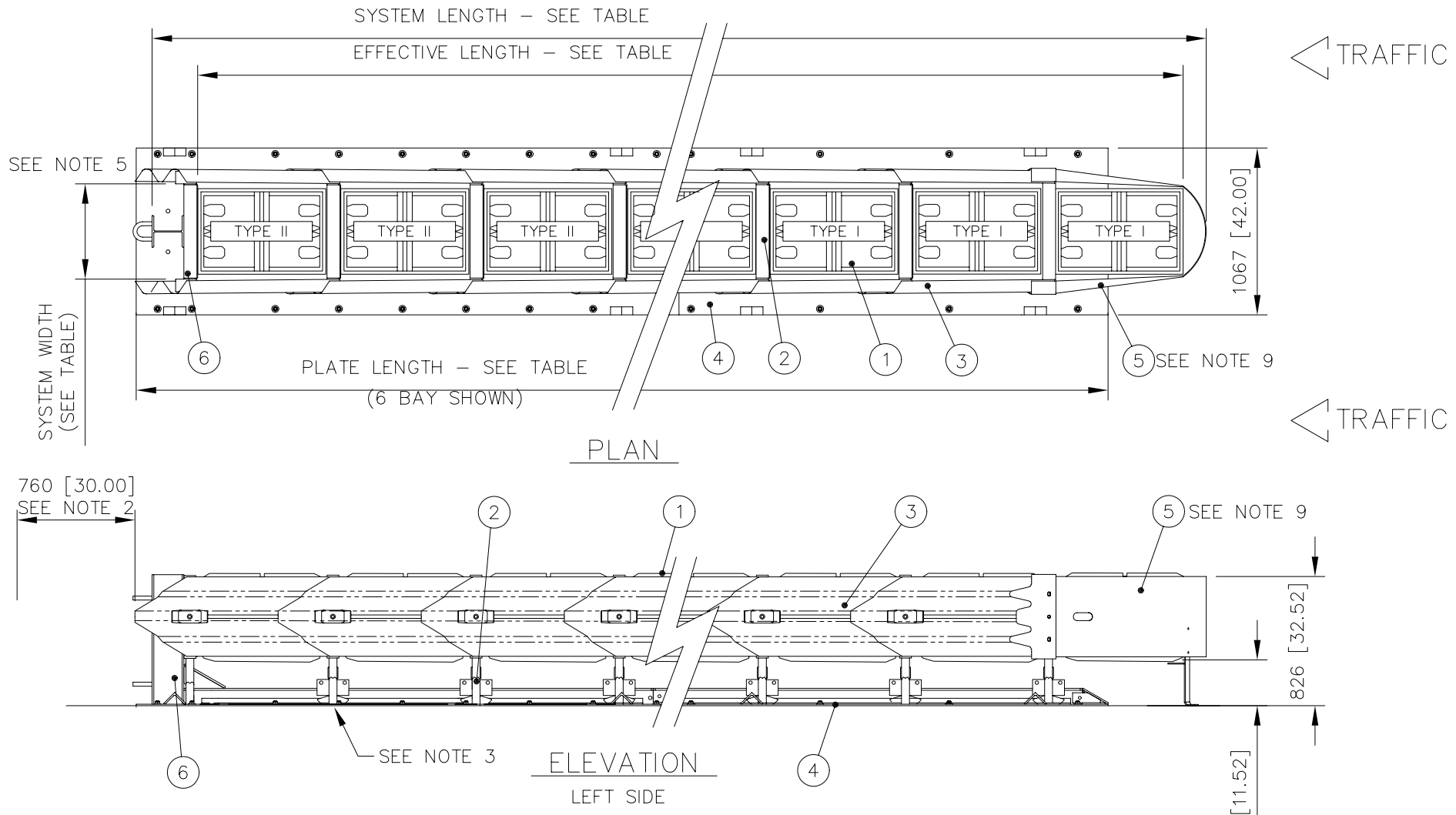
April 30, 2009

FDOT APPROVED DRAWING

QUADGUARD CZ SYSTEM ON A PLATE

Sheet No. 1 of 13

QPL No. S544-0031



PLAN

ELEVATION
LEFT SIDE

NOTES:

1. IN COMPLIANCE WITH THE AASHTO 2002 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
2. PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 760 [30.00] MIN.
3. CAUTION: THE QUADGUARD C.Z. MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE.
   ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   - 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa[4000 PSI] MIN. P.C. CONCRETE PER THE FOLLOWING MINIMUMS:**
     a) 150[6.00] NON REINFORCED ROADWAY OR PAD
     b) 180[7.00] DECK STRUCTURE
   - 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**

   **REFER TO THE QUADGUARD CZ MP-3 ANCHORING SYSTEM SECTION OF THE "QUADGUARD INSTALLATION MANUAL".
4. SEE THE "QUADGUARD SYSTEM PRODUCT MANUAL", FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.
5. WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. THE NUMBER OF BAYS INDICATED IN THE TABLE IS BASED ON CALCULATED VALUES TO ENSURE ADEQUATE SYSTEM CAPACITY TO DISSIPATE THE LONGITUDINAL IMPACT ENERGY OF A 2000 kg VEHICLE TRAVELING AT THE SPEED INDICATED.
△8. THE SIX BAY SYSTEM HAS BEEN FULLY TESTED AT 100 km/h UNDER THE FULL 8 TEST MATRIX OF NCHRP 350 TL-3. SYSTEMS LONGER THAN SIX BAYS SHALL ALSO BE CAPABLE OF MEETING THE OCCUPANT RISK CRITERIA AS RECOMMENDED IN NCHRP 350 FOR VEHICLES WEIGHING 2000 kg IMPACTING HEAD ON AT THE SPEED INDICATED IN THE TABLE.
9. NOSE ASSEMBLY NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.

UNIDIRECTIONAL
MODEL NO. SEE TABLE

* G = GREY or Y = YELLOW

BAYS	610[24] WIDTH MODEL#	762[30] WIDTH MODEL#	914[36] WIDTH MODEL#	SYSTEM LENGTH m	SYSTEM LENGTH ft-in	EFFECTIVE LENGTH m	EFFECTIVE LENGTH ft-in	PLATE LENGTH m	PLATE LENGTH ft-in	MAX DESIGN SPEED km/h [MPH]	# OF CARTRIDGES TYPE I	# OF CARTRIDGES TYPE II
3	QZ2403P*	QZ3003P*	QZ3603P*	4.00	[13'-1"]	3.56	[11'-8"]	3.47	[11'-5"]	70 [44]	3	1
4	QZ2404P*	QZ3004P*	QZ3604P*	4.90	[16'-1"]	4.47	[14'-8"]	6.21	[20'-5"]	80 [50]	3	2
5	QZ2405P*	QZ3005P*	QZ3605P*	5.82	[19'-1"]	5.38	[17'-8"]	6.21	[20'-5"]	90 [56]	4	2
6	QZ2406P*	QZ3006P*	QZ3606P*	6.74	[22'-1"]	6.30	[20'-8"]	6.21	[20'-5"]	100 [62]	4	3
7	QZ2407P*	QZ3007P*	QZ3607P*	7.65	[25'-1"]	7.21	[23'-8"]	8.96	[29'-5"]	△105 [65]	4	4
8	QZ2408P*	QZ3008P*	QZ3608P*	8.56	[28'-1"]	8.13	[26'-8"]	8.96	[29'-5"]	△110 [68]	4	5
9	QZ2409P*	QZ3009P*	QZ3609P*	9.48	[31'-1"]	9.04	[29'-8"]	8.96	[29'-5"]	△115 [71]	4	6

KEY

1. QUADGUARD CARTRIDGE
2. DIAPHRAGM
3. FENDER PANEL
4. C.Z. PLATE W/MONORAIL
5. NOSE ASSEMBLY
6. C.Z. BACKUP

Revisions	Date	Rev.	By	Ckd.	App.

REFERENCES

SERIAL# _____
SALES ORDER# _____
EH PROJECT# _____
DESIGN SPEED △See Chart Above
NOSE COLOR _____
NUMBER OF UNITS _____

DIAPHRAGM ASSY.	35-40-07
NOSE ASSY.	35-40-05
FENDER PANEL ASSY.	35-40-04
C.Z. BACKUP/PLATE ASSY.	35-40-28
LIFTING KIT	35-40-23
ANCHOR KIT	SH02, SH03 & SH04

DRAWN: S. CHAFFIN	DATE: 12/07/04
DESIGNED: R. Brougher	DATE: 12/19/01
CHECKED: A. FRANKLIN	DATE: 12/07/04
APPROVED R. BROUGHER	DATE: 12/08/04
CAD FILE: 602493.dwg	

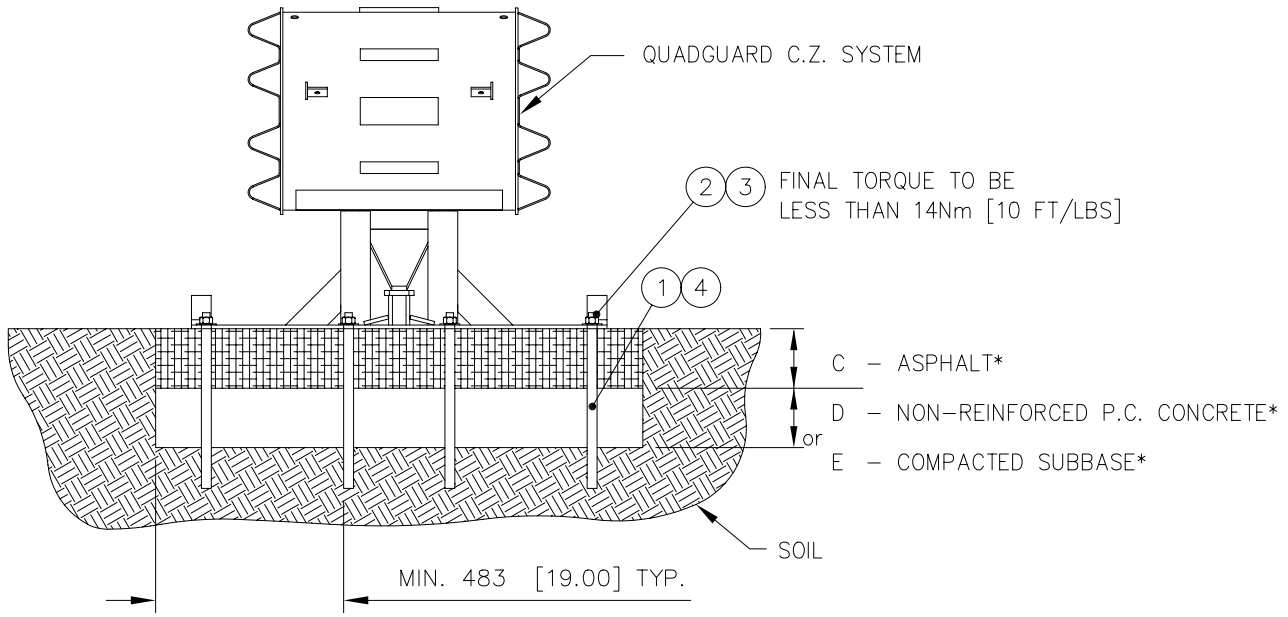
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® c.z. SYSTEM ON A PLATE FOR CONSTRUCTION ZONES

SCALE	DWG.	SHEET	REV
1:40	60-24-93	1 of 4	–

PARTS LIST					
ITEM	STOCK NO.	DESCRIPTION	REQ'D		
		BAYS →	3	6	9
1	2700731–0500	ROD,THREADED,3/4x18,G5,G	20	30	40
2	2704341–0000	NUT,HX,3/4,G,GR DH	20	30	40
3	2708081–0000	WASHER,FLAT,3/4X2,HVY,G	20	30	40
4	3525100–0000	MP–3,QUART PACKAGE	5	8	10
5	2735492–0000	LABEL,CRATE,QG CZ,LIFT KIT	1	1	1

NO. OF BAYS (DIAPHRAGMS)	ASSEMBLY NUMBER
3	3540643–0000
4 THRU 6	3540646–0000
7 THRU 9	3540649–0000



QUADGUARD CZ SECTION VIEW

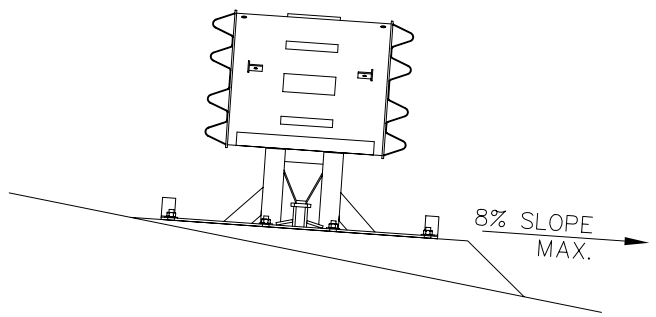
SCALE – 1:20

REFER TO QUADGUARD CZ ANCHORING SYSTEM INSTALLATION & SAFETY INSTRUCTIONS FOR FURTHER INFORMATION

*MATERIALS:
- C – MISCELLANEOUS ASPHALTIC CONCRETE
- D – 28 MPa [4000 PSI] P. C. CONCRETE
- E – STABILIZED SUBBASE, PREPARED & COMPACTED

DEPTH COMBINATION

"C"	"D"	"E"	REQ'D STUD LENGTH
––	152mm [6"]	––	180mm [7"]
76mm [3"]	76mm [3"]	––	460mm [18"]
152mm [6"]	––	152mm [6"]	460mm [18"]
203mm [8"]	––	––	460mm [18"]



CROSS SLOPE DETAIL

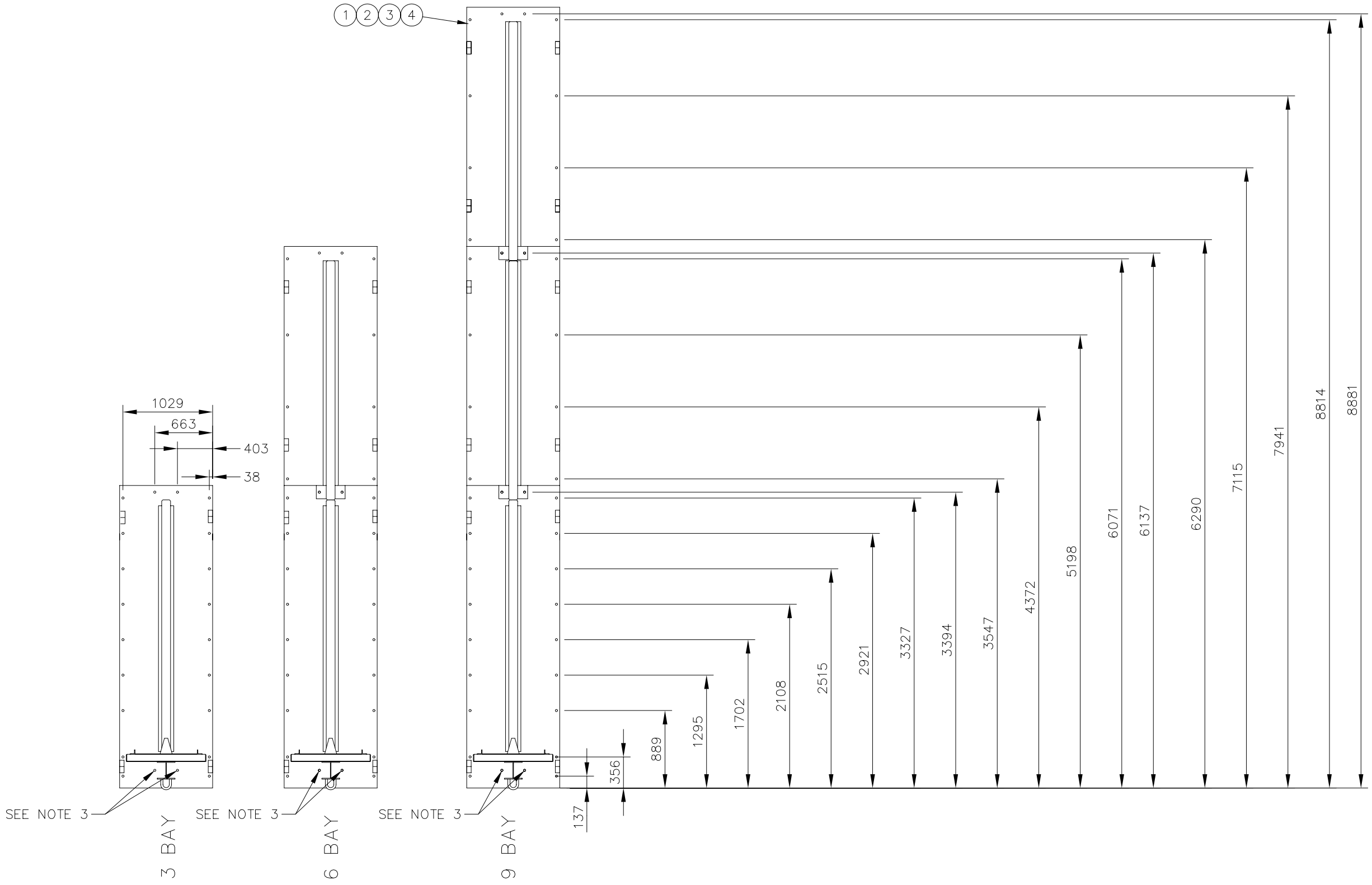
SCALE – 1:30
SEE NOTE 1

ANCHOR SYSTEM:

1. CROSS SLOPE OF PLATE SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. USE THE ANCHOR PLATES AS A TEMPLATE FOR DRILLING HOLES. HOLE LOCATIONS ARE GIVEN ON SHEETS 3 AND 4 FOR REFERENCE PURPOSES ONLY.
3. USE MP–3 POLYESTER ANCHOR SYSTEM, SUPPLIED BY ENERGY ABSORPTION SYSTEMS, OR APPROVED EQUAL. QUADGUARD CZ SYSTEMS INSTALLED ON ASPHALT MUST BE INSPECTED TO ENSURE THE ANCHORS ARE STILL PROPERLY SET FOLLOWING EACH IMPACT. RE–ANCHOR AS NECESSARY.
4. EVERY HOLE IN THE BACKUP PLATE AND ADAPTER PLATE(S) MUST HAVE AN MP–3 STUD ANCHORING IT, EXCEPT AS NOTED ON SHEETS 3 & 4.

ASSEMBY NO. 354064*–0000

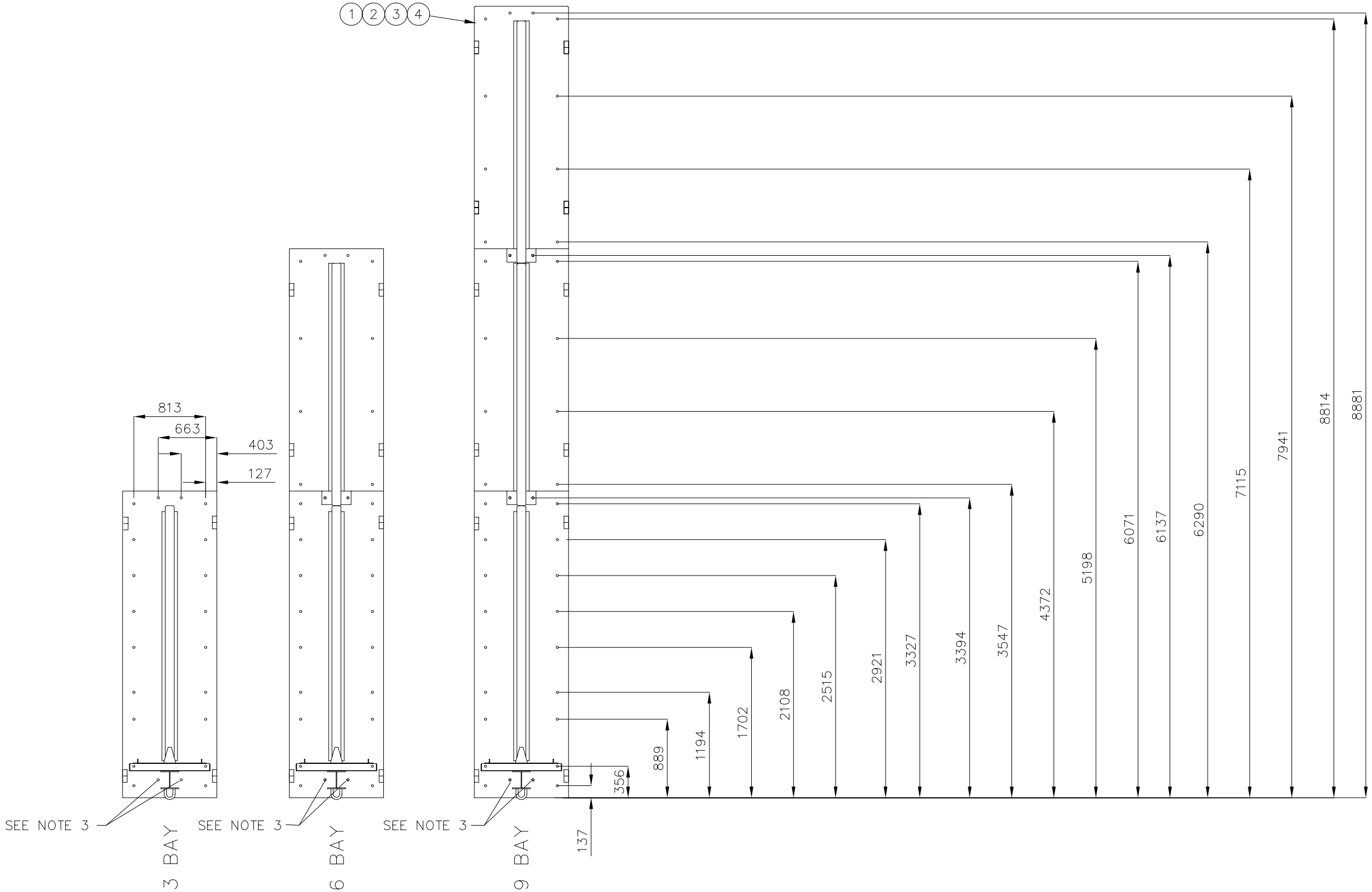
DRAWN: S. CHAFFIN	DATE: 12/07/04	*ENERGY ABSORPTION SYSTEMS, INC.* ENGINEERING AND RESEARCH DEPARTMENT	
DESIGNED: R. Brougher	DATE: 12/17/01	QuadGuard® SYSTEM CZ ON A PLATE,MP–3 ANCHOR KIT,QG, 3 BAY B/U,3 BAY ADAPTER PLATES	
CHECKED: A. FRANKLIN	DATE: 12/07/04		
APPROVED R. BROUGHER	DATE: 12/08/04		
Q.C. J.M.E.	DATE: 12/08/04		
CAD FILE: 602493 SH02.dwg		SCALE 1:50	DWG. 60–24–93
		SHEET 2 of 4	REV –



ANCHOR BOLT LOCATIONS

NOTES:
1. USE THE ANCHOR PLATES AS A TEMPLATE FOR DRILLING HOLES. HOLE LOCATIONS ARE GIVEN HERE FOR REFERENCE PURPOSES ONLY.
2. UNITS ARE MILLIMETERS.
3. DO NOT ANCHOR AT THIS LOCATION.

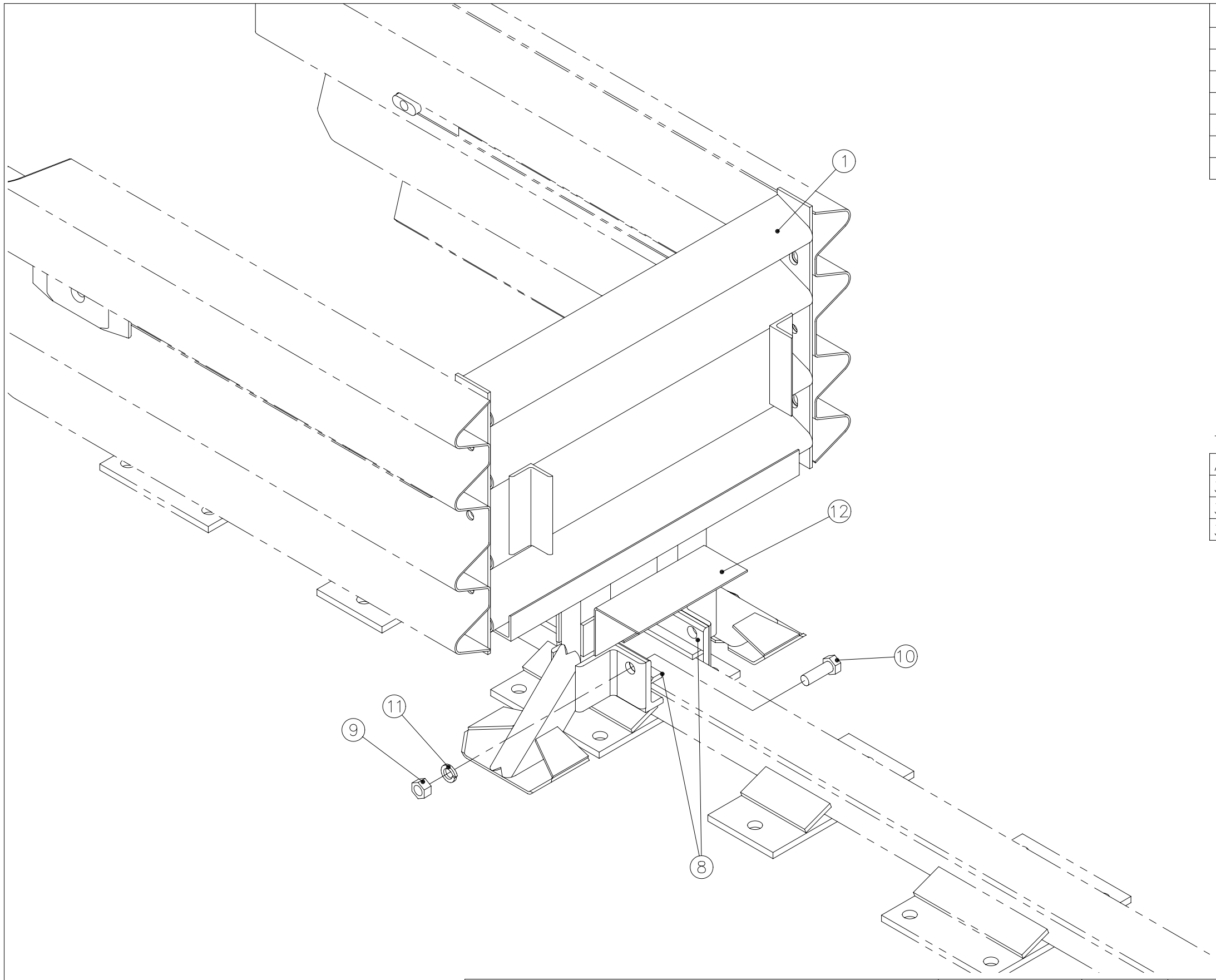
DRAWN: S. CHAFFIN	DATE: 12/07/04	*ENERGY ABSORPTION SYSTEMS, INC.* ENGINEERING AND RESEARCH DEPARTMENT	
DESIGNED: R. Brougher	DATE: 12/17/01	QuadGuard® SYSTEM CZ ON A PLATE,MP-3 ANCHOR KIT,QG, 3 BAY B/U,3 BAY ADAPTER PLATES 24" & 30" SYSTEMS	
CHECKED: A. FRANKLIN	DATE: 12/07/04		
APPROVED R. BROUGHER	DATE: 12/08/04		
Q.C. J.M.E.	DATE: 12/08/04		
CAD FILE: 602493 SH03.dwg		SCALE 1:50	DWG. 60-24-93 / SHEET 3 of 4 / REV –



ANCHOR BOLT LOCATIONS

NOTES:
1. USE THE ANCHOR PLATES AS A TEMPLATE FOR DRILLING HOLES. HOLE LOCATIONS ARE GIVEN HERE FOR REFERENCE PURPOSES ONLY.
2. UNITS ARE MILLIMETERS.
3. DO NOT ANCHOR AT THIS LOCATION.

DRAWN: S. CHAFFIN	DATE: 12/07/04	ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT	
DESIGNED: R. Brougher	DATE: 12/17/01	QuadGuard® SYSTEM CZ ON A PLATE,MP-3 ANCHOR KIT,QG, 3 BAY B/U,3 BAY ADAPTER PLATES 36" SYSTEM	
CHECKED: A. FRANKLIN	DATE: 12/07/04		
APPROVED R. BROUGHER	DATE: 12/08/04		
Q.C. J. M. E.	DATE: 12/08/04		
CAD FILE: 602493 SH04.dwg		SCALE 1:50	DWG. 60-24-93 / SHEET 4 of 4 / REV –



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE A	DIAPHRAGM,QB,QG,G	1.00
8	2760091-0000	MONORAIL GUIDE,QG,G	2.00
9	2704341-0000	NUT,HX,3/4,G,GR DH	4.00
10	2699121-0000	BOLT,HX,3/4X2,G8,G	4.00
11	2708201-0000	WASHER,LOCK,3/4,G	4.00
12	2760292-0000	BRACKET,CART SUPPORT,DIAPHRAGM	2.00

TABLE A

ASSY. NO.	STOCK NO.	DESCRIPTION	WIDTH
3540071-0000	2761011-0000	DIAPHRAGM,QB,24,QG,G	610 [24.00]
3540072-0000	2761021-0000	DIAPHRAGM,QB,30,QG,G	760 [30.00]
3540073-0000	2761031-0000	DIAPHRAGM,QB,36,QG,G	915 [36.00]

ASSEMBLY NO. SEE TABLE A

REFERENCES

DRAWN: J. Espinoza	DATE: 5-2-96	
DESIGNED:	DATE:	
CHECKED: S. Trageser	DATE: 5/17/96	
APPROVED: J. Machado	DATE: 5/17/96	
CAD FILE: 354007.dwg		
NEXT ASSEMBLY:		

Revisions	Date	Rev.	By	Ckd.	App.
DEL ITEMS 2,4,5,&6,ADDED ITEM 12,UPDATED CART SUPPORT	11/04/97	D	RGC	KRM	DLJ
CHGD #5 & #10 BOLT DIRECTION,#2 WAS 2760101	8/8/96	B	DLS	STT	JVM
#7 WAS 2708021-0000	07/08/97	C	JF	BB	SPT

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

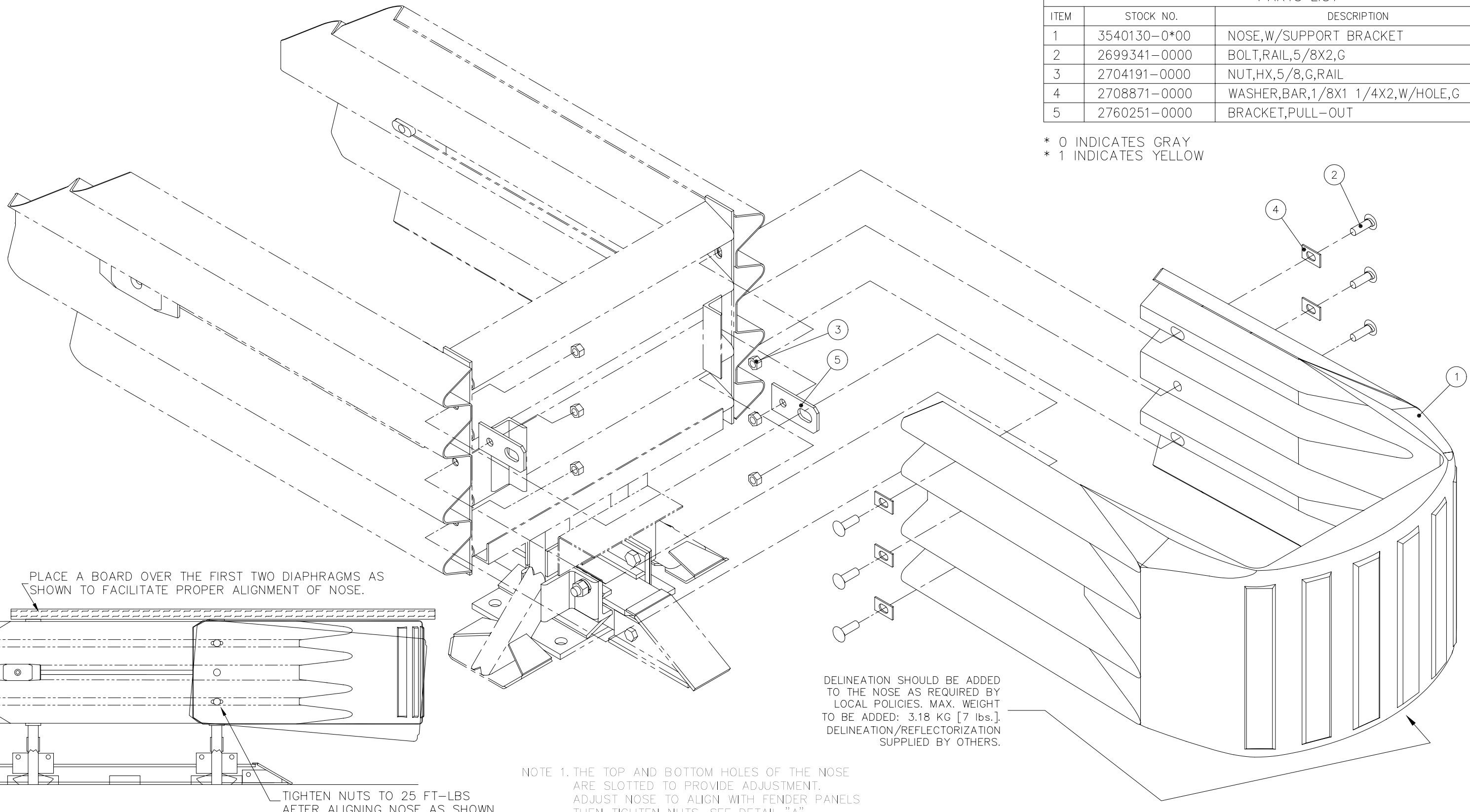
QUADGUARD® SYSTEM

DIAPHRAGM ASSY, QG

SCALE	DWG.	SHEET	REV
N.T.S.	35-40-07	1 of 1	D

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	3540130–0*00	NOSE,W/SUPPORT BRACKET	1.00
2	2699341–0000	BOLT,RAIL,5/8X2,G	6.00
3	2704191–0000	NUT,HX,5/8,G,RAIL	6.00
4	2708871–0000	WASHER,BAR,1/8X1 1/4X2,W/HOLE,G	6.00
5	2760251–0000	BRACKET,PULL–OUT	2.00

* 0 INDICATES GRAY
* 1 INDICATES YELLOW



PLACE A BOARD OVER THE FIRST TWO DIAPHRAGMS AS SHOWN TO FACILITATE PROPER ALIGNMENT OF NOSE.

TIGHTEN NUTS TO 25 FT–LBS AFTER ALIGNING NOSE AS SHOWN.

DETAIL "A"
SCALE: 1:20

DELINEATION SHOULD BE ADDED TO THE NOSE AS REQUIRED BY LOCAL POLICIES. MAX. WEIGHT TO BE ADDED: 3.18 KG [7 lbs.]. DELINEATION/REFLECTORIZATION SUPPLIED BY OTHERS.

NOTE 1. THE TOP AND BOTTOM HOLES OF THE NOSE ARE SLOTTED TO PROVIDE ADJUSTMENT. ADJUST NOSE TO ALIGN WITH FENDER PANELS THEN TIGHTEN NUTS, SEE DETAIL "A".

ASSEMBLY NO. 3540050–0100 (YELLOW)
ASSEMBLY NO. 3540050–0000 (GRAY)

REFERENCES

Revisions	Date	Rev.	By	Ckd.	App.
UPDATED CARTRIDGE SUPPORT	11/03/97	C	RGC	KRM	DLJ
ADDED DETAIL "A"	03/23/99	D	TB	KM	SPT
REVISED 'DELINEATION...' NOTE	07/11/01	E	RSG	DMO	SPT

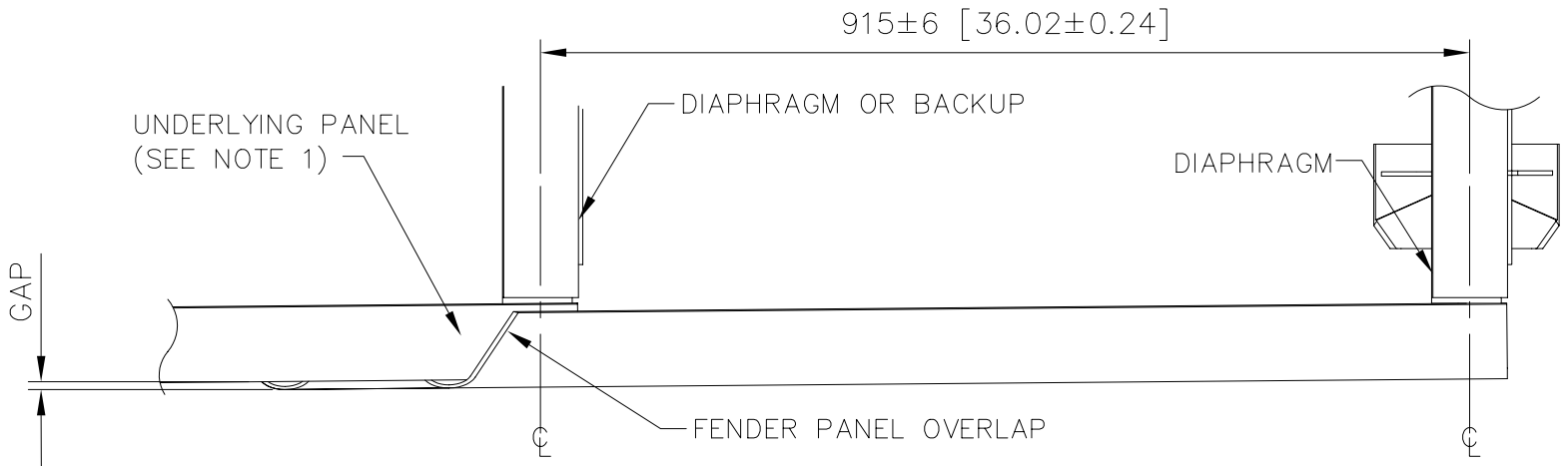
DRAWN: D. Staus	DATE: 5/20/96
DESIGNED: MHO/JVM	DATE: 3/1/96
CHECKED: S. Trageser	DATE: 5/21/96
APPROVED M. Oberth	DATE: 5/22/96
CAD FILE: 354005.dwg	
NEXT ASSEMBLY:	

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® SYSTEM

NOSE ASSY,QG

SCALE	DWG.	SHEET	REV
1:10	35–40–05	1 of 1	E



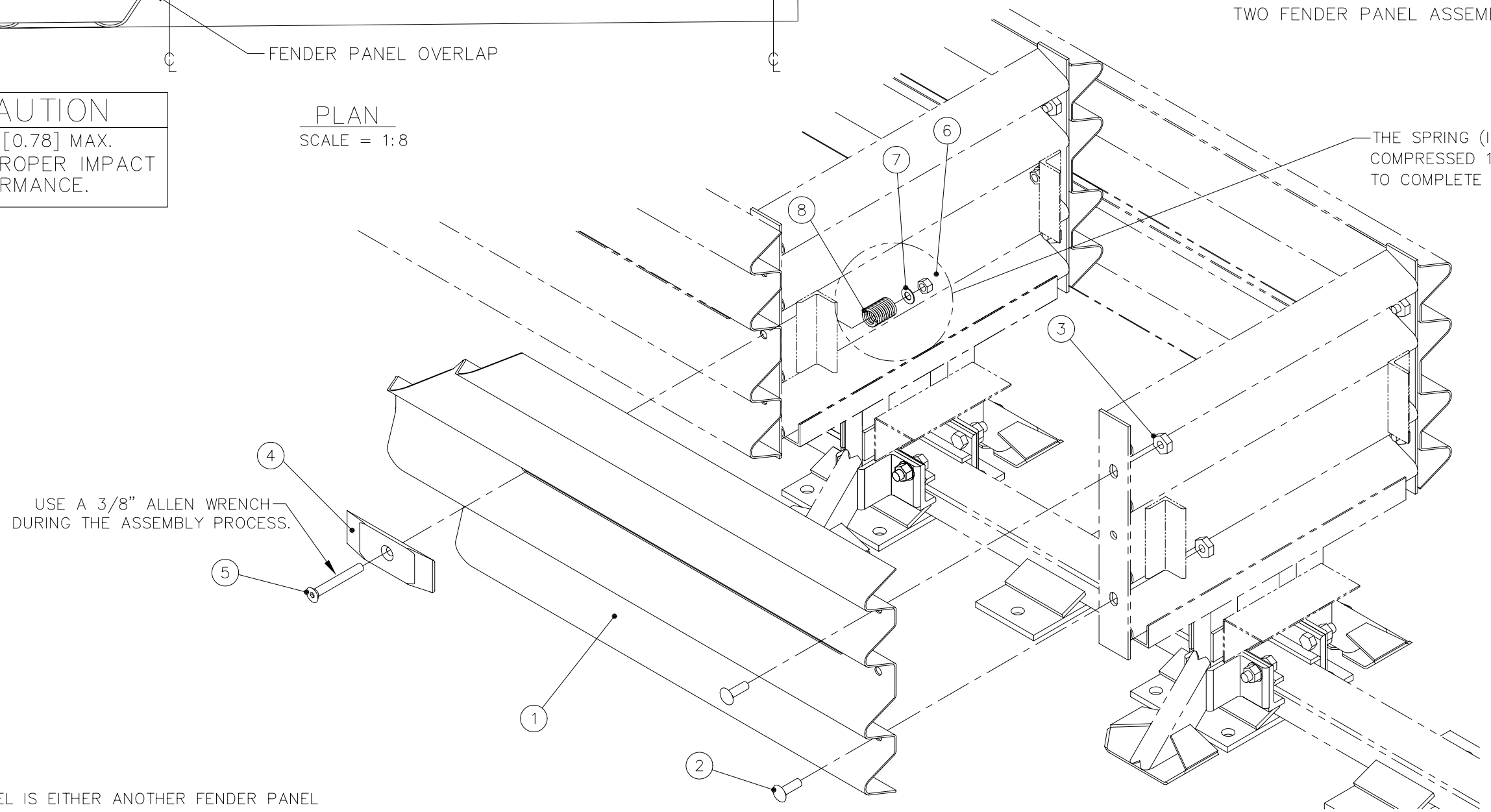
CAUTION

20 [0.78] MAX.
FOR PROPER IMPACT
PERFORMANCE.

PLAN
SCALE = 1:8

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	2760081-0000	PANEL,FENDER,QG,G	1.00
2	2699341-0000	BOLT,RAIL,5/8X2,G	2.00
3	2704191-0000	NUT,HX,5/8,G,RAIL	2.00
4	2708841-0000	WASHER,MUSHROOM,CAST,QG,G	1.00
5	2706604-0000	SCREW,FL,5/8X5,G8,G,SOCKET	1.00
6	2704141-0000	NUT,HX,5/8,G	1.00
7	2708291-0000	WASHER,FLAT,5/8X1 3/4,G	1.00
8	2715343-0000	SPRING,DIE,1 1/4 OD X5/8X1 1/2	1.00

TWO FENDER PANEL ASSEMBLIES REQUIRED PER BAY.



NOTES:

1. UNDERLYING PANEL IS EITHER ANOTHER FENDER PANEL OR, IN THE CASE OF THE LAST FENDER PANEL IT COULD BE A BACKUP SIDE PANEL, EXTENSION PANEL OR TRANSITION PANEL.
2. UNITS OF MEASUREMENT ARE IN MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

ASSEMBLY NO. 3540040-0000

Revisions	Date	Rev.	By	Ckd.	App.
CORRECTED DIAPHRAGM SPACING	10/28/98	G	RGC	STT	KRM
DIAPHRAGM SPACING WAS FRONT TO FRONT	11/26/01	H	DDW	JME	DMO
8 WAS 2021611-0000, 7 QTY WAS 4.0	4/22/04	I	DK	JME	AC

REFERENCES

DRAWN: J. Espinoza	DATE: 5/21/96	
DESIGNED: JVM/MHO	DATE: 3/1/96	
CHECKED: S. Trageser	DATE: 5/21/96	
APPROVED J. Machado	DATE: 5/21/96	
CAD FILE: 354004.dwg		
NEXT ASSEMBLY: ALL MODELS		

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® SYSTEM

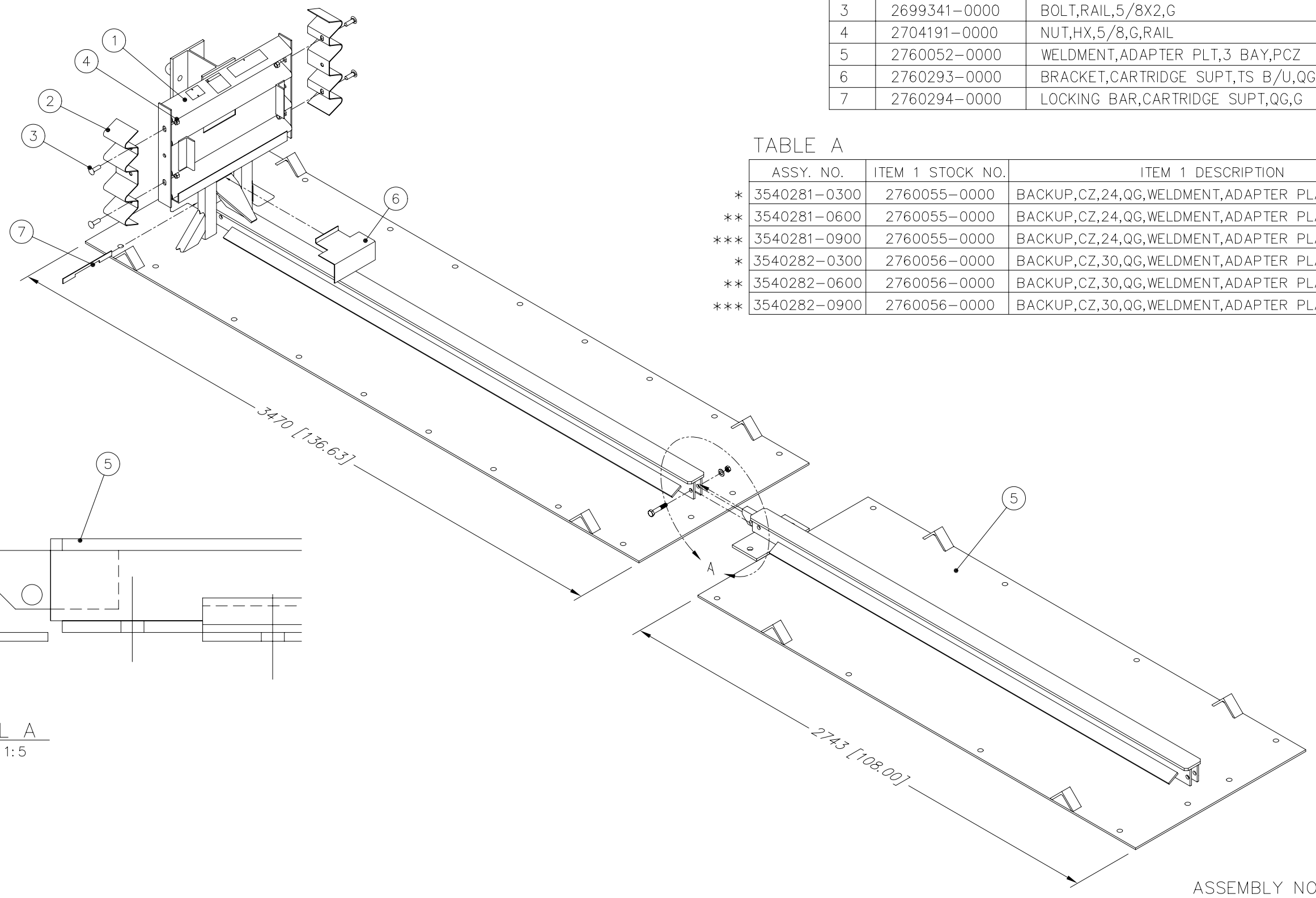
FENDER PANEL ASSY, QG

SCALE	DWG.	SHEET	REV
1:12	35-40-04	1 of 1	I

PARTS LIST	BAYS >	* 3 BAY	** 4 – 6	*** 7 –9
ITEM	STOCK NO.	DESCRIPTION	REQ'D	REQ'D	REQ'D
1	SEE TABLE A	BACKUP,CZ,ADAPTER PLATE,3 BAY,QG,G	1.00	1.00	1.00
2	2760141–0000	PANEL,SIDE,QG,G	2.00	2.00	2.00
3	2699341–0000	BOLT,RAIL,5/8X2,G	4.00	4.00	4.00
4	2704191–0000	NUT,HX,5/8,G,RAIL	4.00	4.00	4.00
5	2760052–0000	WELDMENT,ADAPTER PLT,3 BAY,PCZ	0.00	1.00	2.00
6	2760293–0000	BRACKET,CARTRIDGE SUPT,TS B/U,QG,G	1.00	1.00	1.00
7	2760294–0000	LOCKING BAR,CARTRIDGE SUPT,QG,G	1.00	1.00	1.00

TABLE A

	ASSY. NO.	ITEM 1 STOCK NO.	ITEM 1 DESCRIPTION	WIDTH
*	3540281–0300	2760055–0000	BACKUP,CZ,24,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	610 [2'–0"]
**	3540281–0600	2760055–0000	BACKUP,CZ,24,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	610 [2'–0"]
***	3540281–0900	2760055–0000	BACKUP,CZ,24,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	610 [2'–0"]
*	3540282–0300	2760056–0000	BACKUP,CZ,30,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	762 [2'–6"]
**	3540282–0600	2760056–0000	BACKUP,CZ,30,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	762 [2'–6"]
***	3540282–0900	2760056–0000	BACKUP,CZ,30,QG,WELDMENT,ADAPTER PLATE,3 BAY,G	762 [2'–6"]



DETAIL A
SCALE 1:5

ASSEMBLY NO. SEE TABLE

REFERENCES

DRAWN: L. Corker	DATE: 03/19/03
DESIGNED: R. Brougher	DATE: 12/17/01
CHECKED: K. Mortensen	DATE: 04/02/03
APPROVED D. Wulff	DATE: 04/02/03
CAD FILE: 354028.dwg	
NEXT ASSEMBLY:	

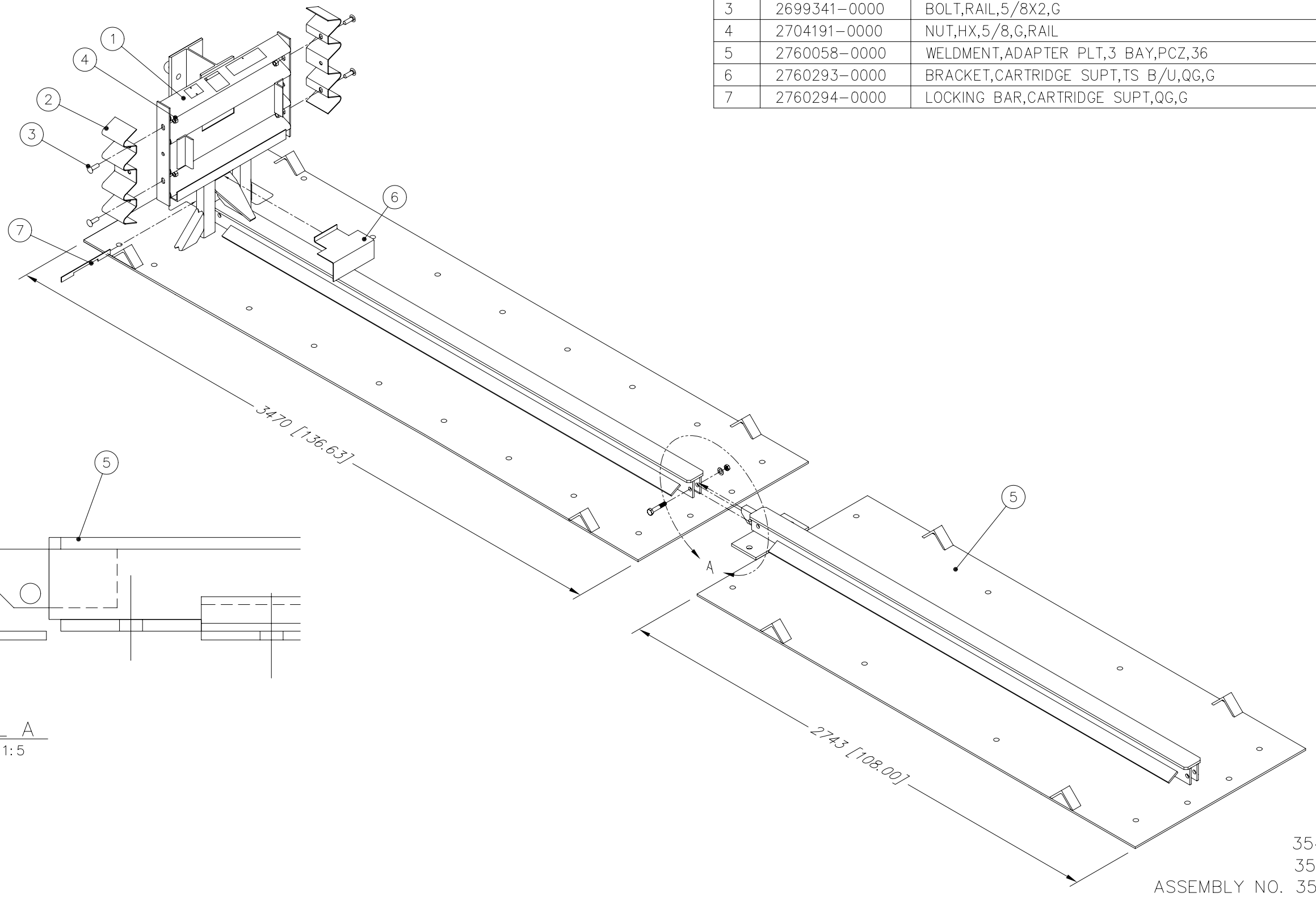
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD™ SYSTEM 24 & 30 BACKUP ASSY, CZ,PORTABLE,QG

SCALE	DWG.	SHEET	REV
1=25	35–40–28	1 of 2	D

Revisions	Date	Rev.	By	Ckd.	App.
PCN 1908, REMOVED ANCHORING REFERENCES	10/18/04	D	RGC	STT	ACF
UPDATED BASE PLATES	12/04/03	B	RGC	STT	ACF
REPLACED CHAIN ON ITEMS 5 & 1 WITH ANG	5/7/04	C	DPH	STT	ACF

PARTS LIST			BAYS >	* 3	** 4–6	*** 7–9
ITEM	STOCK NO.	DESCRIPTION		REQ'D	REQ'D	REQ'D
1	2760057–0000	BACKUP,CZ,36,QG,WELDMENT,ADAPTER PLATE,3 BAY,G		1.00	1.00	1.00
2	2760141–0000	PANEL,SIDE,QG,G		2.00	2.00	2.00
3	2699341–0000	BOLT,RAIL,5/8X2,G		4.00	4.00	4.00
4	2704191–0000	NUT,HX,5/8,G,RAIL		4.00	4.00	4.00
5	2760058–0000	WELDMENT,ADAPTER PLT,3 BAY,PCZ,36		0.00	1.00	2.00
6	2760293–0000	BRACKET,CARTRIDGE SUPT,TS B/U,QG,G		1.00	1.00	1.00
7	2760294–0000	LOCKING BAR,CARTRIDGE SUPT,QG,G		1.00	1.00	1.00



DETAIL A
SCALE 1:5

3540283–0300 *
3540283–0600 **
ASSEMBLY NO. 3540283–0900 ***

Revisions	Date	Rev.	By	Ckd.	App.
PCN 1908, REMOVED ANCHORING REFS.	10/19/04	D	RGC	STT	ACF
UPDATED BASE PLATES	12/05/03	B	RGC	STT	ACF
REPLACED CHAIN ON ITEMS 5 & 1 WITH ANG	5/7/04	C	DPH	STT	ACF

REFERENCES

DRAWN: L. Corker	DATE: 06/12/03	
DESIGNED: R. Brougher	DATE: 12/17/01	
CHECKED: B. Kornow	DATE: 06/18/03	
APPROVED: R. Brougher	DATE: 06/18/03	
CAD FILE: 354028.dwg		
NEXT ASSEMBLY:		

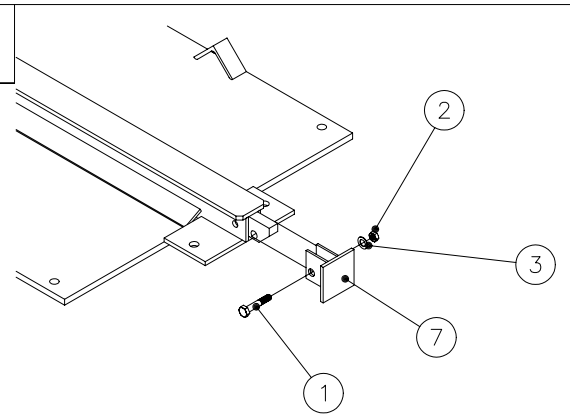
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD™ SYSTEM

36 BACKUP ASSY,CZ,PORTABLE,QG

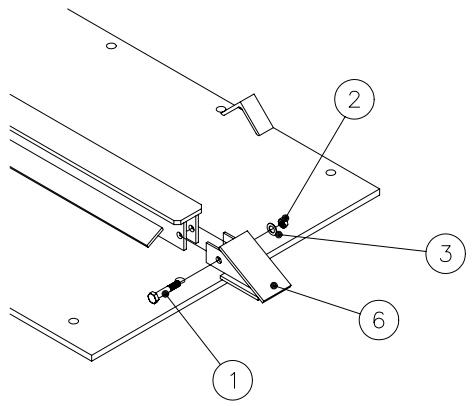
SCALE	DWG.	SHEET	REV
1=25	35–40–28	2 of 2	D

NEXT ASSEMBLY:
QPCZCVR



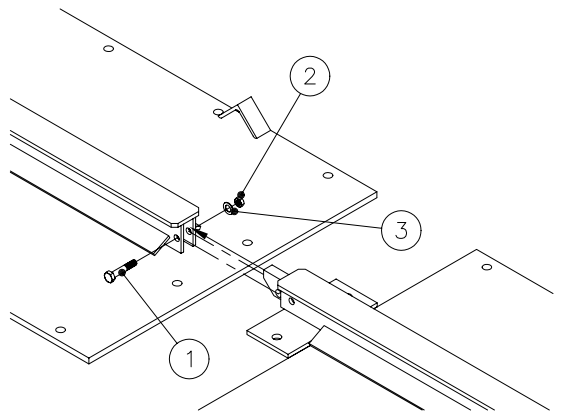
END PLATE ATTACHMENT

SCALE – 1:25
SEE NOTE 8



ENDCAP ATTACHMENT

SCALE – 1:25

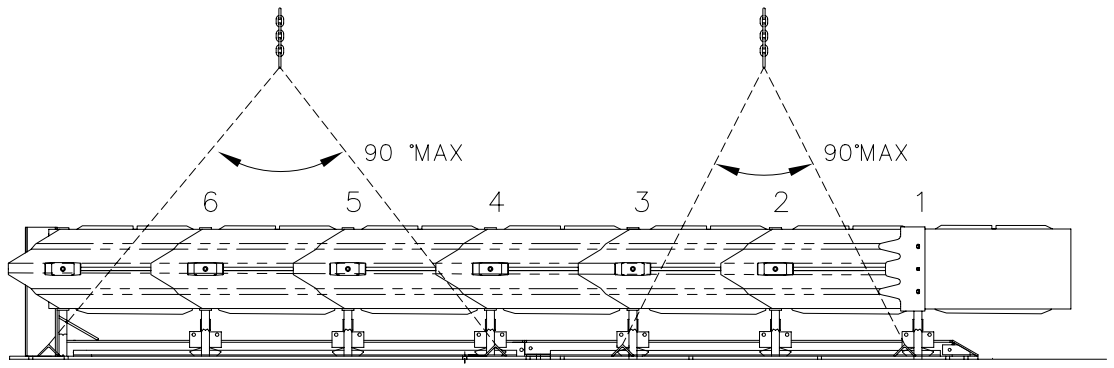


MONORAIL ATTACHMENT

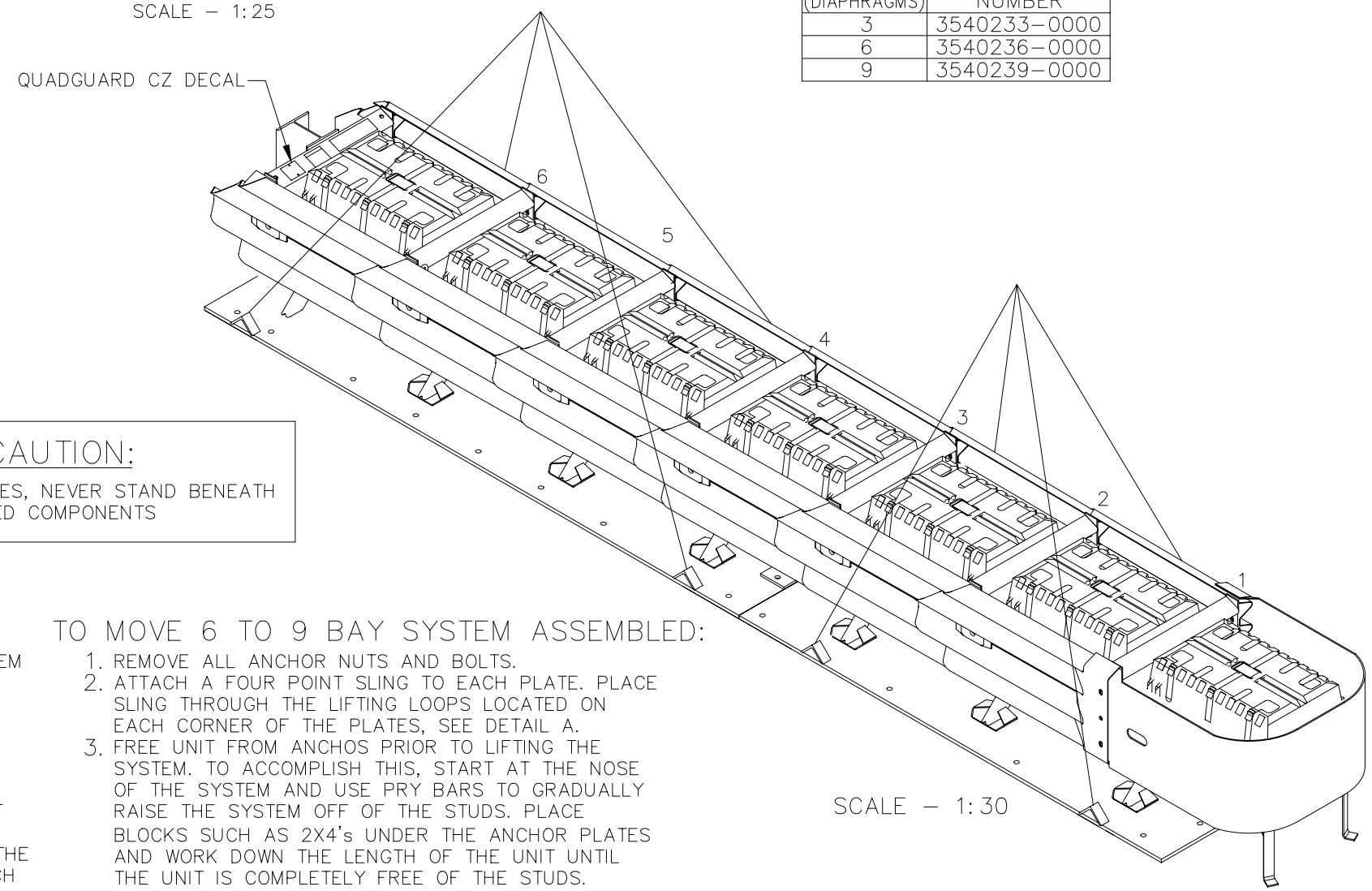
SCALE – 1:25

PARTS LIST					
ITEM	STOCK NO.	DESCRIPTION	REQ'D		
		BAYS →	3	6	9
1	2699571–0000	BOLT,HX,5/8X3 1/2,G5,G	1	2	3
2	2704141–0000	NUT,HX,5/8,G	1	2	3
3	2708231–0000	WASHER,LOCK,5/8,G	1	2	3
4	354023Z–0000	INST.,QG PORTABLE CZ LIFT KIT	1	1	1
6	2760040–0000	ENDCAP,MONORAIL,QPCZ,G	1	1	1
7	2760042–0000	END PLATE,CZ,LIFTING KIT	0	1	1

NO. OF BAYS (DIAPHRAGMS)	ASSEMBLY NUMBER
3	3540233–0000
6	3540236–0000
9	3540239–0000



DETAIL A
6 BAY QUADGUARD cz
SCALE – 1:50



SCALE – 1:30

CAUTION:
TO AVOID INJURIES, NEVER STAND BENEATH LIFTED COMPONENTS

TO MOVE SYSTEM IN 3 BAY SECTIONS:

1. REMOVE CARTRIDGE FROM BAYS THAT HAVE A MONORAIL BOLT CONNECTING SECTIONS TOGETHER BELOW THEM
2. REMOVE MUSHROOM BOLTS FOR THE BAY THAT HAS HAD THE CARTRIDGE REMOVED. THIS WILL BECOME THE BREAK POINT FOR THE QUADGUARD SYSTEM.
3. REMOVE ALL ANCHOR BOLTS.
4. REMOVE MONORAIL BOLTS THAT CONNECT SECTIONS TOGETHER.
5. LIFT ONLY ONE 3 BAY SECTION AT A TIME. START WITH NOSE SECTION FIRST.
6. PLACE SLING THROUGH THE LIFTING LOOPS ON EACH CORNER OF THE PLATE. THE SLING NEEDS TO BE A MINIMUM OF 9 FEET LONG OUT TO EACH LIFTING LOOP. MAKE SURE THAT THE SLING IS LONG ENOUGH THAT THE ANGLE IS LESS THAN 90° AS SHOWN.
7. FREE UNIT FROM ANCHORS PRIOR TO LIFTING THE SYSTEM. TO ACCOMPLISH THIS, START AT THE NOSE OF THE SYSTEM AND USE PRY BARS TO GRADUALLY RAISE THE SYSTEM OFF OF THE ANCHORS. PLACE BLOCKS SUCH AS 2X4's UNDER THE ANCHOR PLATES AND WORK DOWN THE LENGTH OF THE UNIT UNTIL THE UNIT IS COMPLETELY FREE OF THE ANCHORS.
8. INSTALL THE END PLATE (ITEM 12) OR ENDCAP (ITEM 11) ON EACH 3 BAY SECTION OF THE MONORAIL AS SHOWN (ITEM 12 NOT NEEDED FOR THE BACKUP SECTION). IF THE TOTAL UNIT HAS 7 OR MORE BAYS, BOTH THE ENDCAP AND END PLATE WILL NEED TO BE MOVED TO THE SECTION THAT IS BEING LIFTED TO PREVENT THE DIAPHRAGMS FROM SLIDING OFF THE MONORAIL.
9. LIFT THE SYSTEM TO NEW LOCATION, REMOVE END PLATE(S) AND RE–INSTALL SYSTEM.

TO MOVE 6 TO 9 BAY SYSTEM ASSEMBLED:

1. REMOVE ALL ANCHOR NUTS AND BOLTS.
2. ATTACH A FOUR POINT SLING TO EACH PLATE. PLACE SLING THROUGH THE LIFTING LOOPS LOCATED ON EACH CORNER OF THE PLATES, SEE DETAIL A.
3. FREE UNIT FROM ANCHOS PRIOR TO LIFTING THE SYSTEM. TO ACCOMPLISH THIS, START AT THE NOSE OF THE SYSTEM AND USE PRY BARS TO GRADUALLY RAISE THE SYSTEM OFF OF THE STUDS. PLACE BLOCKS SUCH AS 2X4's UNDER THE ANCHOR PLATES AND WORK DOWN THE LENGTH OF THE UNIT UNTIL THE UNIT IS COMPLETELY FREE OF THE STUDS. ATTACH SLINGS TO A MULTIPLE SPREAD LIFTING
4. BAR/BEAM AND ADJUST SLING POSITIONS AS NEEDED IN ORDER TO BALANCE THE SYSTEM. LIFT THE SYSTEM TO NEW LOCATION AND
5. RE–INSTALL.

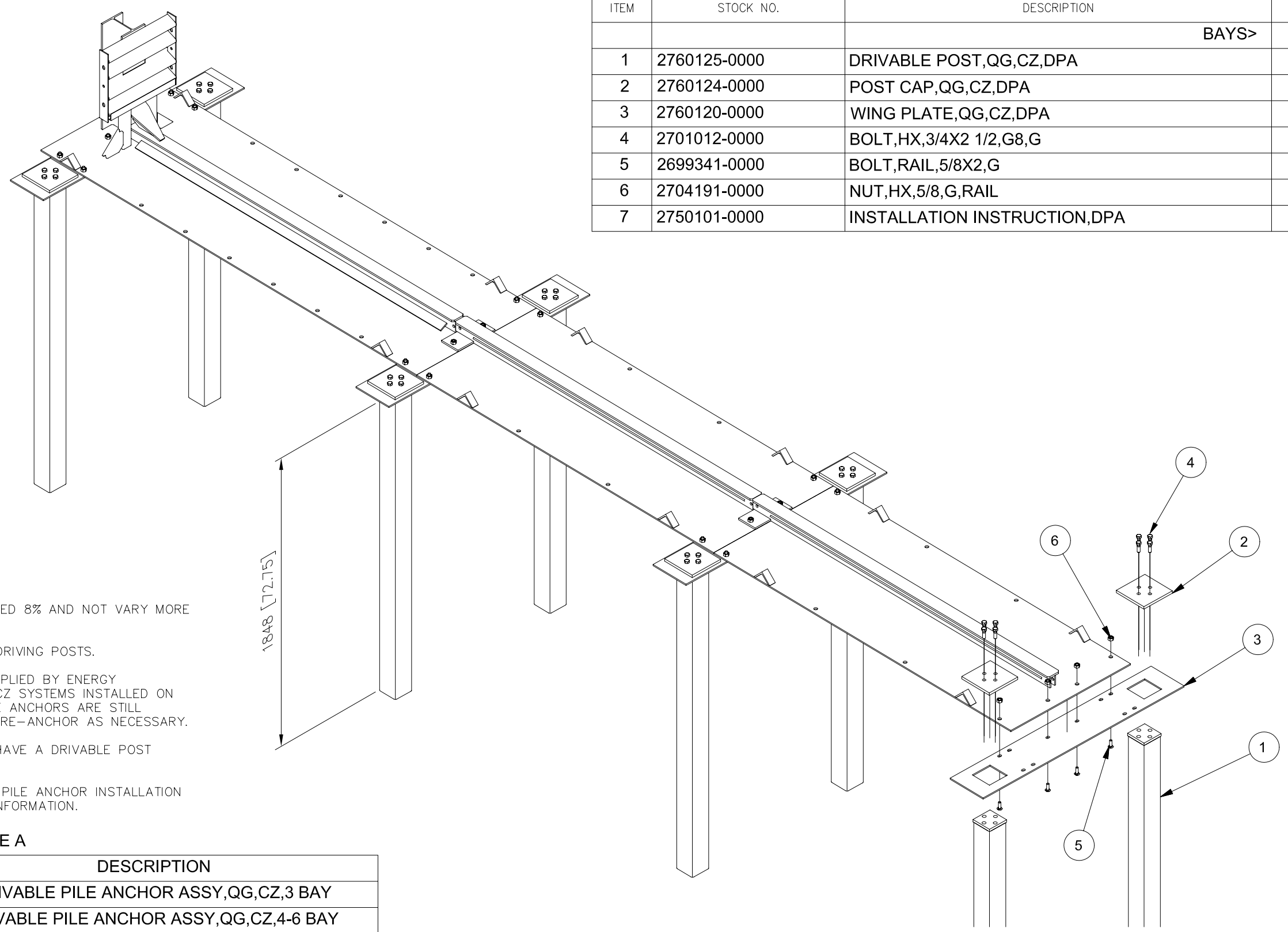
* SEE CHART

ASSEMBLY NO. 354023*–0000

Revisions	Date	Rev.	By	Ckd.	App.	Q.C.
UPDATED LIFTING PACKAGE	08/05/04	C	RGC	JME	ACF	STT
PCN 1908, DELETED SHT'S 2 & 3 W/ ALL ANCHORING	10/18/04	D	RGC	JME	ACF	STT

DRAWN: L. Corker	DATE: 03/21/03	ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT
DESIGNED: R. Brougher	DATE: 12/17/01	QuadGuard® SYSTEM CZ ON A PLATE,QG, LIFTING KIT & INSTRUCTIONS
CHECKED: K. Mortensen	DATE: 03/28/03	
APPROVED R. Brougher	DATE: 03/28/03	
Q.C. J. Espinoza	DATE: 03/28/03	Instruction No. 354023Z–0000
CAD FILE: 354023.dwg		SCALE AS NOTED / DWG. 35–40–23 / SHEET 1 of 1 / REV D

ITEM	STOCK NO.	DESCRIPTION	QTY.		
		BAYS>	3	4-6	7-9
1	2760125-0000	DRIVABLE POST,QG,CZ,DPA	4	6	8
2	2760124-0000	POST CAP,QG,CZ,DPA	4	6	8
3	2760120-0000	WING PLATE,QG,CZ,DPA	2	3	4
4	2701012-0000	BOLT,HX,3/4X2 1/2,G8,G	16	24	32
5	2699341-0000	BOLT,RAIL,5/8X2,G	10	16	22
6	2704191-0000	NUT,HX,5/8,G,RAIL	10	16	22
7	2750101-0000	INSTALLATION INSTRUCTION,DPA	1	1	1



NOTES:
1. CROSS SLOPE OF PLATE SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. USE THE WING PLATES AS A GUIDE FOR DRIVING POSTS.
3. USE DRIVABLE PILE ANCHOR SYSTEM, SUPPLIED BY ENERGY ABSORPTION SYSTEMS, INC. QUADGUARD CZ SYSTEMS INSTALLED ON SOIL MUST BE INSPECTED TO ENSURE THE ANCHORS ARE STILL PROPERLY SET FOLLOWING EACH IMPACT. RE-ANCHOR AS NECESSARY.
4. EVERY HOLE IN THE WING PLATES MUST HAVE A DRIVABLE POST ANCHORING IT.
5. REFER TO QUADGUARD SYSTEM DRIVABLE PILE ANCHOR INSTALLATION ADDENDUM INSTRUCTIONS FOR FURTHER INFORMATION.

TABLE A

NO. OF BAYS	ASSEMBLY NO.	DESCRIPTION
3	3540700-0300	DRIVABLE PILE ANCHOR ASSY,QG,CZ,3 BAY
4-6	3540700-0600	DRIVABLE PILE ANCHOR ASSY,QG,CZ,4-6 BAY
7-9	3540700-0900	DRIVABLE PILE ANCHOR ASSY,QG,CZ,7-9 BAY

ASSEMBLY NO. (SEE TABLE A)

REFERENCES

Revisions	Date	Rev.	By	Ckd.	App.
ITEM 2 DESCRIPT. WAS FTB ST 3/4X10X10,W/HOLES; ADDED ITEM 7	11/5/04	A	TB	STT	AF

DRAWN: T. Busse	DATE: 10/6/04
DESIGNED:	DATE:
CHECKED: A. FRANKLIN	DATE: 10/6/04
APPROVED R. BROUGHER	DATE: 10/6/04
CAD FILE: 354070.dwg	
NEXT ASSEMBLY:	

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® c.z. SYSTEM ON A PLATE
DRIVABLE PILE ANCHOR (DPA) ASSEMBLY

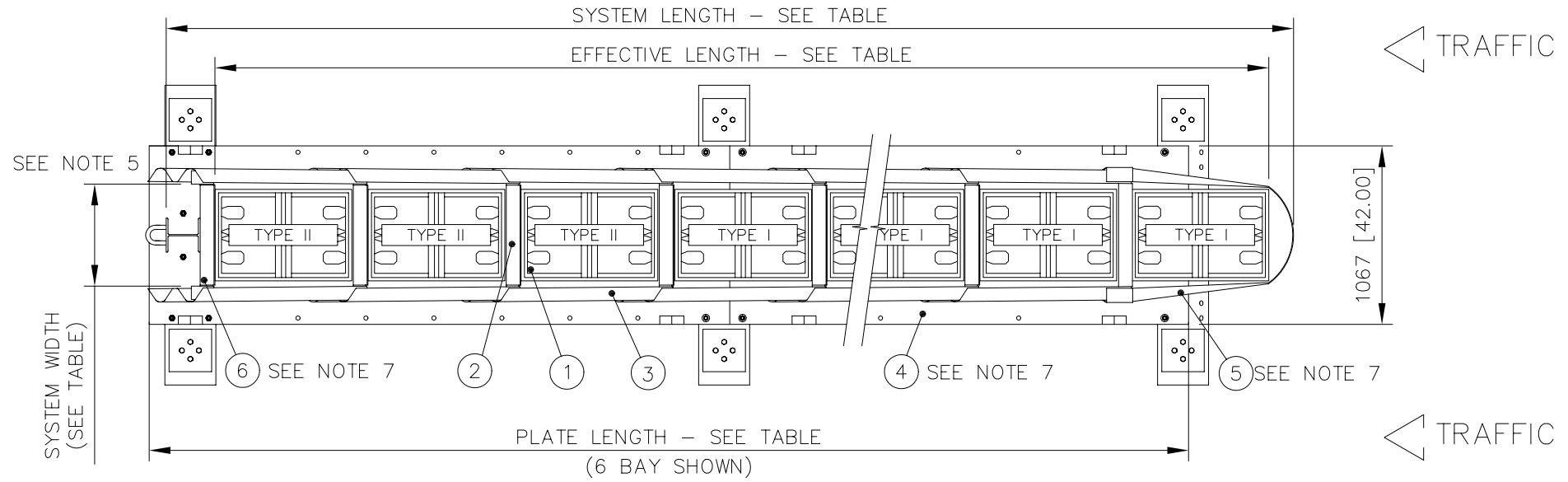
SCALE	DWG.	SHEET	REV
1:30	35-40-70	1 of 1	A

NOTES:

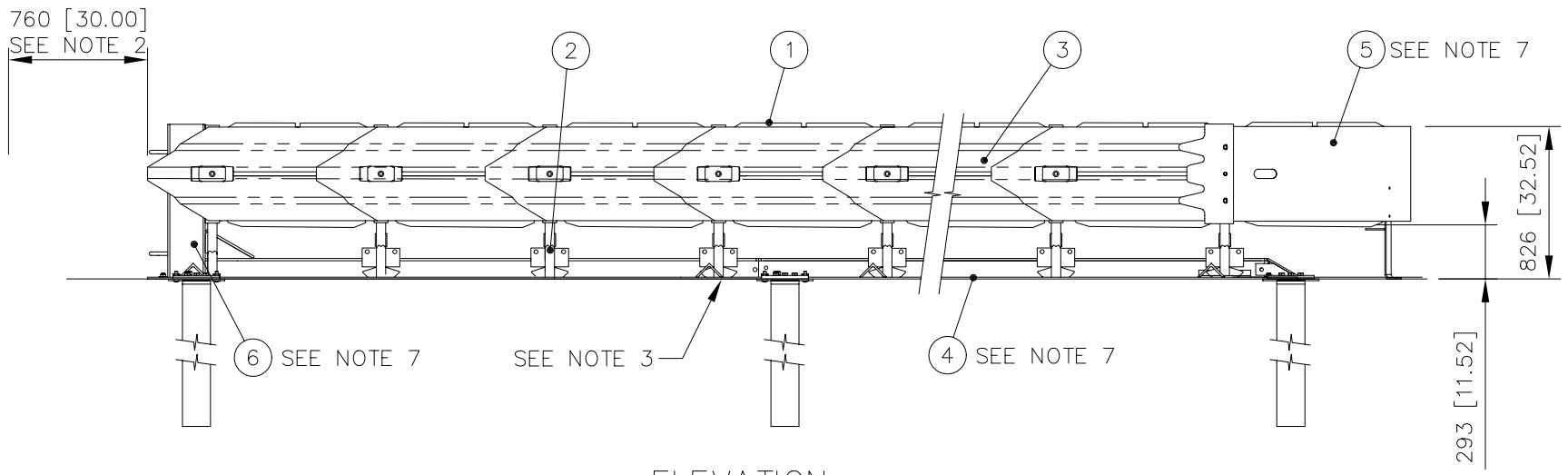
1. IN COMPLIANCE WITH THE AASHTO 2002 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
2. PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 760 [30.00] MIN.
3. CAUTION: THE QUADGUARD C.Z. DPA MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. DPA ASSEMBLY MAY BE USED TO ATTACH SYSTEM TO STRONG SOIL. ASPHALT OVERLAYS SHOULD BE 102 [4.00] THICK OR LESS.
4. SEE THE "QUADGUARD SYSTEM PRODUCT MANUAL", FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.
5. WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. NOSE AND ANCHOR ASSEMBLIES NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.

△8. THE NUMBER OF BAYS INDICATED IN THE TABLE IS BASED ON CALCULATED VALUES TO ENSURE ADEQUATE SYSTEM CAPACITY TO DISSIPATE THE LONGITUDINAL IMPACT ENERGY OF A 2000 kg VEHICLE TRAVELING AT THE SPEED INDICATED.

9. THE SIX BAY QUADGUARD SYSTEM HAS BEEN FULLY TESTED AT 100 km/h UNDER THE FULL 8 TEST MATRIX OF NCHRP 350 TL-3. SYSTEMS LONGER THAN SIX BAYS SHALL ALSO BE CAPABLE OF MEETING THE OCCUPANT RISK CRITERIA AS RECOMMENDED IN NCHRP 350 FOR VEHICLES WEIGHING 2000 kg IMPACTING HEAD ON AT THE SPEED INDICATED IN THE TABLE.



PLAN



ELEVATION

LEFT SIDE

* G = GREY or Y = YELLOW

BAYS	610[24] WIDTH MODEL#	762[30] WIDTH MODEL#	914[36] WIDTH MODEL#	SYSTEM LENGTH m	SYSTEM LENGTH ft-in	EFFECTIVE LENGTH m	EFFECTIVE LENGTH ft-in	PLATE LENGTH m	PLATE LENGTH ft-in	MAX DESIGN SPEED km/h [MPH]	# OF CARTRIDGES TYPE I	# OF CARTRIDGES TYPE II
3	QZ2403DPA*	QZ3003DPA*	QZ3603DPA*	4.00	[13'-1"]	3.56	[11'-8"]	3.47	[11'-5"]	70 [44]	3	1
4	QZ2404DPA*	QZ3004DPA*	QZ3604DPA*	4.90	[16'-1"]	4.47	[14'-8"]	6.21	[20'-5"]	80 [50]	3	2
5	QZ2405DPA*	QZ3005DPA*	QZ3605DPA*	5.82	[19'-1"]	5.38	[17'-8"]	6.21	[20'-5"]	90 [56]	4	2
6	QZ2406DPA*	QZ3006DPA*	QZ3606DPA*	6.74	[22'-1"]	6.30	[20'-8"]	6.21	[20'-5"]	100 [62]	4	3
7	QZ2407DPA*	QZ3007DPA*	QZ3607DPA*	7.65	[25'-1"]	7.21	[23'-8"]	8.96	[29'-5"]	△105 [65]	4	4
8	QZ2408DPA*	QZ3008DPA*	QZ3608DPA*	8.56	[28'-1"]	8.13	[26'-8"]	8.96	[29'-5"]	△110 [68]	4	5
9	QZ2409DPA*	QZ3009DPA*	QZ3609DPA*	9.48	[31'-1"]	9.04	[29'-8"]	8.96	[29'-5"]	△115 [71]	4	6

KEY

1. QUADGUARD CARTRIDGE
2. DIAPHRAGM
3. FENDER PANEL
4. C.Z. PLATE W/MONORAIL
5. NOSE ASSEMBLY
6. C.Z. BACKUP

Revisions	Date	Rev.	By	Ckd.	App.
ADDED NOTES 3, 7 & 8 AND LIFT KIT REF	10/18/04	A	TB	STT	ACF
DWG # WAS QPCZCVR-DPAU,REARRANGED NOTES,REM NUTS ON PLATE	01/19/05	B	RGC	TB	ACF
REVISED NOTE 7	8/23/05	C	RGC	JME	ACF

REFERENCES

SERIAL# _____
SALES ORDER# _____
EH PROJECT# _____
DESIGN SPEED △See Chart Above
NOSE COLOR _____
NUMBER OF UNITS _____

DIAPHRAGM ASSY.	35-40-07
NOSE ASSY.	35-40-05
FENDER PANEL ASSY.	35-40-04
C.Z. BACKUP/PLATE ASSY.	35-40-28
ANCHOR ASSY	35-40-70
LIFTING KIT	35-40-23
PORTABLE BARRIER ANCHOR	3540260-0000

DRAWN: T. Busse	DATE: 10/6/04	
DESIGNED:	DATE:	
CHECKED: A. Franklin	DATE: 10/6/04	
APPROVED: R. Brougher	DATE: 10/6/04	
CAD FILE: QPCZDPA-U.dwg		

UNIDIRECTIONAL
MODEL NO. SEE TABLE

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® c.z. SYSTEM ON A PLATE
FOR CONSTRUCTION ZONES W/DRIVABLE PILE ANCHORAGE

SCALE	DWG.	SHEET	REV
1:40	QPCZDPA-U	1 of 1	C